JANUARY 23, 1941

The IRON AGE

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This Week in The Iron Age

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JANUARY 23, 1941

VOL. 147 NO. 4

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Editorial

Ten Thousand Frying Pans 19

Technical Articles

Does Steel Industry Need New Capacity? 21
Carbide Tools Brazed at Low Cost 32
Automatic Arc Welding 33
Casting of Cylinder Heads 37
Plating Developments 41
Short Run Parts 48

Feature Reports

On the Assembly Line 52
Washington News 56

News and Market Reports

News of Industry	62	Machine Tool Activity	96
Personals	84	Non-Ferrous Market	97
Obituaries	86	Scrap Market and Prices	98
Metal Working Activity	87	Construction Steel	100
Comparison of Prices	88	Iron and Steel Prices	102
Summary of the Week	89	Ferroalloys, Pig Iron Prices	107
The Industrial Pace	90	Warehouse Prices	108
District Market Reports	92	Sales Possibilities	110

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Fatigue Cracks 60
Free Industrial Literature 63
Products Advertised 110
Index to Advertisers 140

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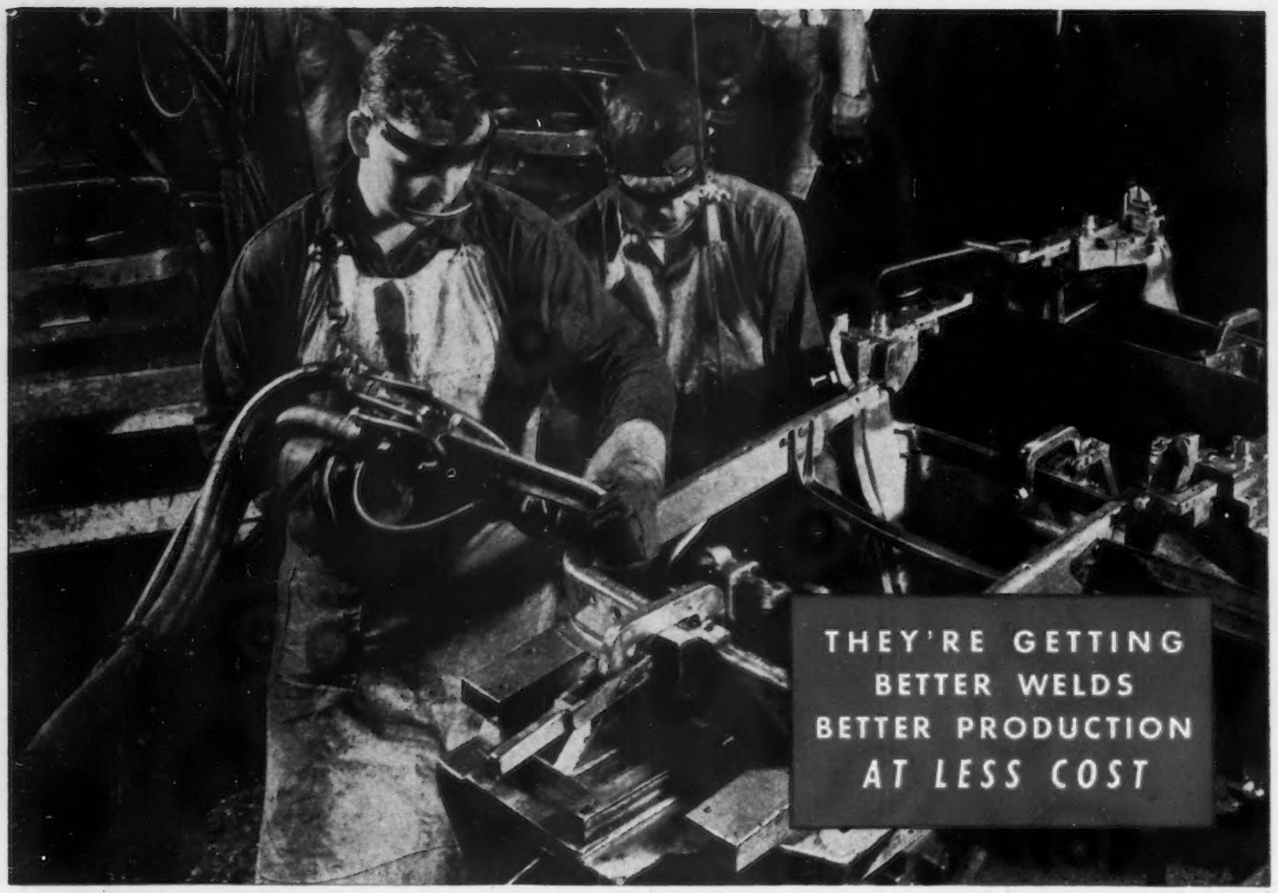

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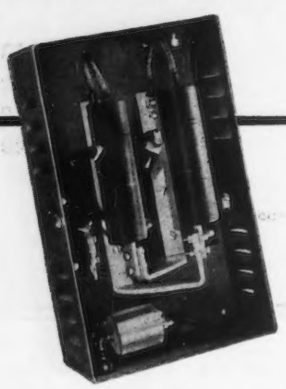

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Westinghouse Weld-O-Trol

The Iron Age

JANUARY 23, 1941

ESTABLISHED 1855

Ten Thousand Frying Pans

THIS epistle is dedicated to the ten thousand sales managers in the metal working industry for whom frying pans are now being heated.

Some of these frying pans are large and some small, according to the particular anatomy of the gentlemen who are destined to be in them. They all have one thing in common, or will have, when the stoves get properly going. They will be hot enough to melt whatever fat may have been put on by sales departments in these "come and get the order" days.

A sales manager, of course, is never without his troubles, even in a forced draft sellers market. But his troubles double when the relationship between his plant capacity and the demand for his product is such that he cannot get enough business to meet the overhead. When that condition arises, there are plenty of other competing sales managers in the same boat and thus is ushered in that vicious and damaging cycle of chiseling, price cutting and loss selling that is the ruination of business.

Over capacity cycles have caused plenty of grief in the past but nothing like the grief that the next one will bring with it. For never before has there been such a forced draft multiplication both of capacity and of competitors. The entire competitive situation is being changed beyond recognition.

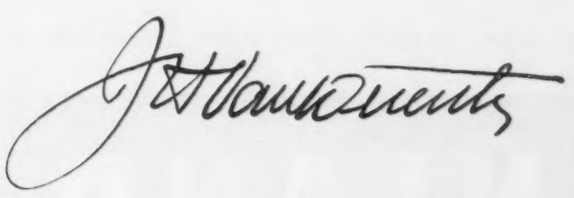
Let me give a typical example. One machinery manufacturer making a non-munitions product has so expanded capacity as to employ directly and indirectly over ten thousand workers. This concern has four or five well organized and long established competitors who have similarly expanded, making total employment of perhaps 25,000 workers on a product for which normal domestic demand would require not over 4000. But this is not all. For each of these concerns has taken on dozens of sub-contractors who are thus "learning the business". Do you think they are going to forget what they have learned after the emergency?

This same situation extends throughout all industry. It is something that has to be. We couldn't stop it even if we wanted to, and we don't want to because it is the only way to meet the requirements of the defense program.

Nevertheless, the far sighted sales manager will face the facts now and prepare for the future. He will polish up his business building and customer holding tools and practice using them now, when less wise and far-sighted executives are letting them rust because the present job can possibly be done without them.

No man can keep his golf clubs in the closet for a year or so and then go out and shoot a 70 in competition.

And remember this: Consumer recognition of a well established name and reputation will do more to keep you out of that frying pan than anything else.



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From this study came a sheet specification written by Inland metallurgists, who personally checked processing methods and quality. These metallurgists, working side by side with Inland skilled inspectors, made certain that this sheet will meet the customer's requirements. Every order placed in the future against this specification will be given the same care and attention. As a result users can depend on Inland quality and uniformity from sheet to sheet, and from order to order.

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TONS of newsprint go to waste and nervous indigestion mounts alarmingly, as practically everyone stands to sing God Bless America and fling invective on this question of large additions to present steel capacity. Certainly the world's greatest industrial nation should be able to examine sanely this not very complicated problem, a problem which a few men of good will could clean up in one afternoon, with no one cast for the "goat" role.

By T. W. LIPPERT,
Technical Editor, The Iron Age

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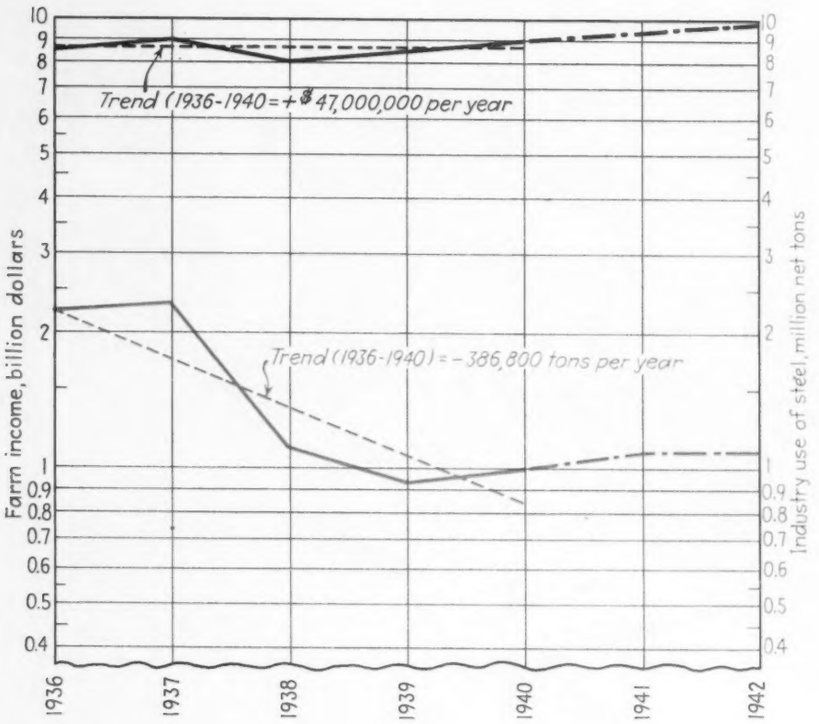
MORE than 400 years ago Bacon set down the truism that, "prosperity is not without many fears."

Steel buyers have worked up a fear of being caught short on steel — they are stuffing warehouses with stocks and flooding producers with futures. Legislators may be persuaded to fear curtailment in production of consumer goods, the result being enmity of workers thrown out of work, and reductions in tax revenues—consequently they press for additional steel making capacity. The public fears war—therefore, alarums of a nearby steel shortage stir up dismay and blind insistence for corrective action. The steel industry fears overwhelming pressure to construct large quantities of unnecessary capacity. And, even though the Government apparently is an exception in that it fears nothing, it is still liable to sponsor something unsound.

How did all these fears develop? How justified are they today? How can they be allayed? It would be most convenient if all these questions could be answered by a few smart and lofty generalities. An adequate and convincing treatment, however, necessitates wading through the sizable quantities of material set forth in the following paragraphs.

No effort will be made to paint the steel industry lily white, to present it as all-knowing, never subject to mean motives, errors, jealousies, chiseling, selfish self-interest, or any other of those weaknesses which plague the human race in general. But, on this question of tremendous increases in capacity, the steel industry stands united in the contention that if practically everyone else can get a hearing, they at least should be permitted to get in their two-cents worth. And, ever hopeful, the steel industry believes its opinion should be weighted more heavily than those emanating from



Agriculture

Year	Farm Income (Million Dollars)	Industry Use of Steel (Thousands of Net Tons)
1936 (actual)	8,499	2,238
1937 (actual)	9,111	2,335
1938 (actual)	8,081	1,110
1939 (actual)	8,581	943
1940 (actual)	9,000	1,000
1941 (estimated)	9,500	1,100
1942 (estimated)	10,000	1,100

Principal Steel Products Involved and Approximate Percentage of Total Domestic Use of Each Product

		Net Tons in 1939
Structural shapes	= 2% =	44,900
Plates	= 2% =	47,600
Bars, small shapes	= 8% =	328,100
Sheets	= 4% =	271,800
Strip	= 3% =	71,900
Pipe, tubing & wire	= 3% =	150,500
All other	= 3% =	28,000

Industry total = 3 per cent, representing 942,800 net tons in 1939.

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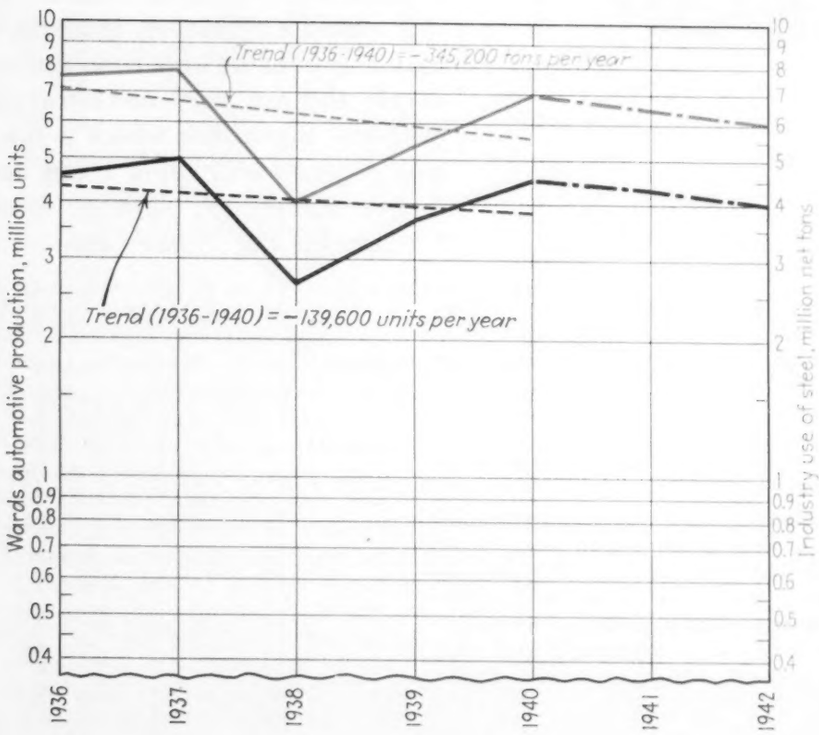


Automotive

Year	Automotive Production (Thousand Units)	Industry Use of Steel (Thousands of Net Tons)
1936 (actual)	4,616	7,517
1937 (actual)	5,016	7,814
1938 (actual)	2,655	4,053
1939 (actual	3,732	5,396
1940 (actual)	4,560	7,000
1941 (estimated)	4,300	6,500
1942 (estimated)	4,000	6,000

Principal Steel Products Involved and Approximate Percentage of Total Domestic Use of Each Product

		Net Tons in 1939
Structural shapes	= 1% =	23,100
Plates	= 4% =	104,500
Bars, small shapes	= 33% =	1,312,800
Sheets	= 35% =	2,599,700
Strip	= 53% =	1,129,800
Pipe, tubing, wire	= 3% =	154,100
All other	= 7% =	65,900

Industry total = 18 per cent, representing 5,396,200 net tons in 1939.

sources which think that cans are made of tin.

The rolling barrage leveled against the steel industry has opened up and moved steadily forward at a pace all too familiar to steel producers, who in the past have been similarly hag-ridden by wars of nerves. The development has been about as follows:

(1) The opening phase, being preliminary bursts by newspaper columnists to soften up the terrain. The spotting was obviously inspired and correlated, but the shells were for the most part rather wabbly.

(2) Big Bertha was then brought into action, in the guise of a really impressive report prepared by Louis J. Paradiso, under the direction of Gardiner C. Means, of the National Resources Planning Board. The title alone is dramatic, "Capital Requirements: A Study in Methods as Applied to the Iron and Steel Industry." This study is the one which, unfortunately, over the past week or so has been given such widespread newspaper play, although its purpose has been misinterpreted and its tentative and purely hypothetical conclusions blindly accepted as recommendations for remedial or anticipatory adjustments in the steel industry.

(3) A stick of time bombs dropped—a rather secret study by Melvin de Chazeau of the National Defense Advisory Commission Priorities Board is reported as going the rounds behind the scenes. A couple of newspaper columnists have supposedly given this study the once-over, and advise that it proves that the country needs 10,000,000 tons of new capacity, speed being most imperative.

(4) A gas blanket was laid down last week—that is, an elaborate stricture leveled by the National Economic and Social Planning Association, entitled "Wanted—More Steel." This baby is one that really packs a wallop. It could be very fancifully described as a mellifluous philippic—or it could be more prosaically described as a plausible-sounding mapping of the steel industry's future, with more than enough overtones of State Socialism to make Board Chairmen in many steel plants dance painfully around on one foot and show the whites of their eyes. And, of course, the mental agitation of the Board Chairmen is in no way allayed by the many naive technical pronouncements throughout the report, so obviously incorrect to those familiar with the industry.

(5) The element of suspense is contributed by Gano Dunn, of J. G. White Engineering Corp., now preparing a report for President Roosevelt. Mr. Dunn's acumen is so generally respected that all concerned will likely accept his appraisal, an appraisal likely to fall somewhere between that of Melvin de Chazeau and the horrified admonitions of the steel industry.

(6) Supporting action developed in an unexpected quarter — the SWOC announced a few days ago, via Phillip Murray, that present capacity was ample for all needs.

Thus the big push approaches the zero hour. The steel industry stands slack-jawed, disbelief in its eyes, completely ignored, incredulously awaiting the kill. But, it is only understandably human that steel makers make a few defensive gestures, perhaps feebly point out that—

(1) Steel making facilities in this country have been rebuilt during the Depression years, so that today they are technically superior to any other in the world.

(2) That mills in the United States are today grinding out far more steel than *all* the remainder of the world together. This pace can be maintained, or even advanced, as long as an emergency exists.

(3) That the Government so far has failed to specify how much steel rearmament will require. The Government, of course, may not actually know. In any case, steel capacity today is more than tenfold maximum independent estimates of defense needs. Obviously, therefore, recent demands for large expansion of capacity have nothing whatever to do with rearmament, but rather could easily cloak theoretical economic planning which might itself interfere with defense if forced onto the industry.

(4) That no industry, defense or otherwise, is stymied for lack of steel, nor will they be in the future if ordinary intelligence is brought to bear on the problems.

(5) That additional specialized capacity, i. e., electric furnace, imperative for armament industries, has been willingly and quickly installed and will be progressively expanded in order to be fully adequate for all discernible future armament needs. Furthermore, this new capacity will be no serious future burden either to the industry or the country, what with expected maintenance of stainless steel activity and aircraft demands in the post-war period.

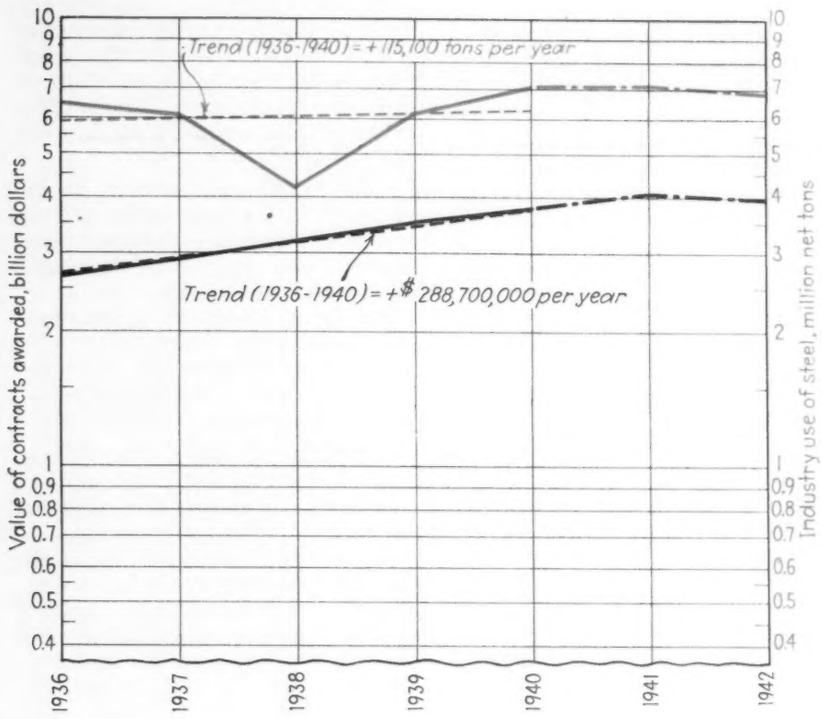
(6) That recent attacks on the position of the steel industry, even though frequently honestly conceived and laboriously developed, and certainly patriotic in intent, have erred grievously in basic assumptions, the errors being of a type so easily made by those not familiar with the intricacies of steel metallurgy and production.

(7) That sizable spurts in capacity require greater expenditures and intra-company dislocation than government studies anticipate. The time and effort consumed in installing such capacity would be enervating to the extreme. And, anyhow, sizable increases could not possibly be brought into play for from one to two years, or even longer, for the increases must travel back through iron ore and coal carrying facilities and into the mines.

(8) That current non-military steel consumption is following the all-too-familiar pattern of past spurts in industrial activity. Stocks are far more sizable in many directions than generally realized; and misgivings emanating from Washington are only making worse a situation which could easily be solved in a couple of hours by a few realistic producers and government officials around a conference table.

In short, the attitude of responsible producers of steel could be set down about like this. "The country is in a precarious international situation and an unprecedented armament program is under way. Don't let us waste so much energy and work up so much venom on a problem which is artificially whipped to a white heat. Let's get a few steel executives and a few responsible government officials together and in one afternoon get this whole problem quieted down and sensibly evaluated. No armament industry will ask in vain for steel, and no non-defense industry will be squeezed. Let's devote our energies to our many real problems, not fritter them away on completely unnecessary bickering."

Such is the attitude of the steel industry. It is quite difficult to



Construction

Year	Value of Contracts Awarded (Million Dollars)	Industry Use of Steel (Thousands of Net Tons)
1936 (actual)	2,675	6,468
1937 (actual)	2,913	6,038
1938 (actual)	3,197	4,398
1939 (actual)	3,550	6,125
1940 (actual)	3,800	7,000
1941 (estimated)	4,150	7,100
1942 (estimated)	4,000	6,800

Principal Steel Products Involved and Approximate Percentage of Total Domestic Use of Each Product

		Net Tons in 1939
Rails	= 1% =	11,900
Track accessories	= 2% =	13,200
Structural shapes	= 73% =	1,938,700
Plates	= 32% =	748,400
Bars, small shapes	= 8% =	316,700
Concrete bars	= 94% =	951,700
Tin and black plate	= 3% =	68,300
Sheets	= 15% =	1,119,400
Strip	= 5% =	109,700
Pipe, tubing, wire	= 13% =	700,600
All other	= 15% =	146,200

Industry total = 20 per cent, representing 6,124,800 net tons in 1939.

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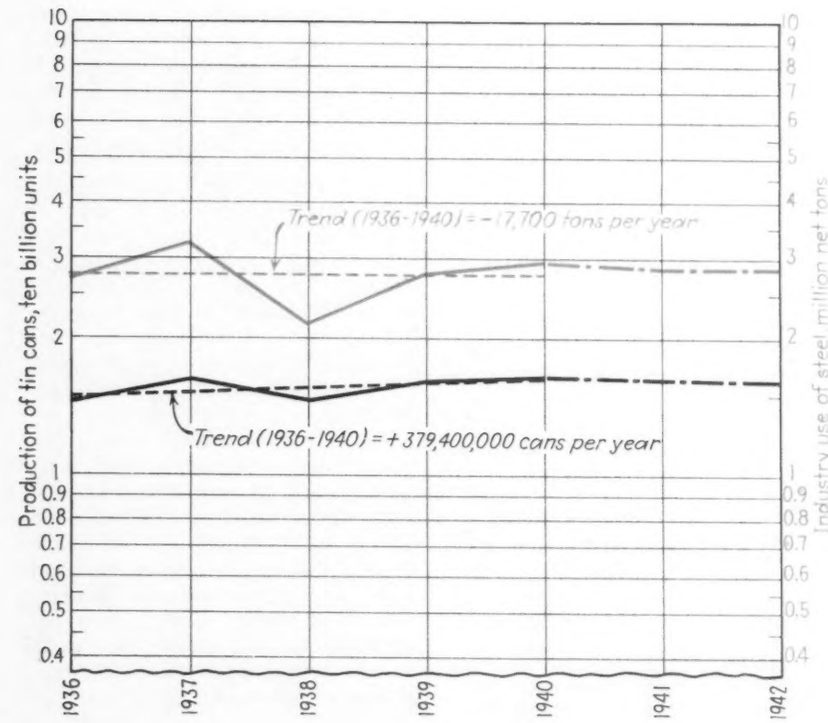


Light Containers

Year	Tin Cans Produced (Millions)	Industry Use of Steel (Thousands of Net Tons)
1936 (actual)	14,405	2,750
1937 (actual)	16,216	3,219
1938 (actual)	14,594	2,137
1939 (actual)	16,220	2,742
1940 (actual)	16,300	2,900
1941 (estimated)	16,250	2,800
1942 (estimated)	16,250	2,800

Principal Steel Products Involved and Approximate Percentage of Total Domestic Use of Each Product

		Net Tons in 1939
Plates	= 1% =	20,000
Tin and black plate	= 89% =	2,108,200
Sheets	= 6% =	454,400
Strip	= 4% =	82,400
Pipe, tubing and wire	= 1% =	40,000
All other	= 2% =	21,800

Industry total = 9 per cent, representing 2,741,700 net tons in 1939.

conceive of any man's criticizing such a position.

Basic Data Not Valid

Now to return to the Paradiso-Means report, previously mentioned under (2). This is the only study so far uncovered for public examination and criticism. The report is very elaborate, worked out in most minute detail, and quite obviously represents a very sizable expenditure of effort. Messrs. Paradiso and Means are quite clever, but, of course, the steel industry looks at them with jaundiced eyes, believing their activities to be colored by deep-rooted sympathy for some variety of state socialism. Irrespective of their political beliefs, however, it does both our capitalistic democracy or a possible, hoped-for state socialism, a definite disservice to map out the future of the all-important basic steel industry on fallacious assumptions. Certainly, even Messrs. Paradiso and Means should agree to that.

The principal objective of the Paradiso-Means study is to present a methodology for determining the capital equipment requirements of the steel industry. The methodology presented therein is predicated on economic formulae which represent about the most complicated techniques available. However, even though such impressive words are used to designate the procedure and even though in application it is a highly arcane process, the whole analysis still certainly depends on the validity of the assumptions and estimates which comprise the basic data.

In charity to the authors, the report in its present condition should definitely not have been released for such wide distribution. Furthermore, it is equally unfortunate that the cloak of econometric formulae and the prestige of the National Resources Committee give to it a superficial air of validity at a time when the problem of steel capacity deserves the more careful, sympathetic and accurate consideration. And, it is to be soberly hoped for that Mr. Gano Dunn, in his report to President Roosevelt, does not duplicate the mental costiveness, or apply too trustingly the data developed by Mr. Paradiso.

But, enough of these generalized condemnations. More detailed criticism is called for.

There are two serious errors which largely invalidate the conclusions of the report with respect to the estimates of additional capacity and equipment required at the assumed income levels.

(1) Based on the entirely fallacious assumption that the rated capacities of the steel industry, as published by the American Iron and Steel Institute, are not practical, the report discounts the blast furnace and open hearth capacity of the industry by more than 10 per cent and of the rolling mills by 5 per cent.

(2) Over-estimates have been made of the net retirements per year of existing equipment.

Thus, even assuming the hypotheses of the report that any one of the three levels of consumer income might be attained by 1941, and past correlations with iron and steel production maintained, the following downward revisions of estimated additional capacities required *would nevertheless have to be made* as a result of these errors:

	83 Billion Dollar Level		89 Billion Dollar Level		94 Billion Dollar Level	
	No. of Plants (Fces)	Rated Cap. (Millions of G. T.)	No. of Plants (Fces)	Rated Cap. (Millions of G. T.)	No. of Plants (Fces)	Rated Cap. (Millions of G.T.)
BLAST FURNACES, PIG IRON						
*As Reported	22	6.6	47	16.5	73	25.7
As Revised	None	None	24	8.4	47	16.6
OPEN HEARTH, INGOTS ONLY						
As Reported	153	15.3	281	28.1	396	39.6
As Revised	44	4.4	158	15.8	261	26.1

Note: It is of extreme importance to point out that if cognizance is taken of the industry's reserve Bessemer ingot capacity over and above the tonnage included in the latest published capacity totals, it is possible, by substituting Bessemer for open hearth to the fullest extent, that further downward revisions in the estimated additional open hearth requirements may be made as follows:

OPEN HEARTH, 2nd REVISION	14	1.4	128	12.8	231	23.1

***There is evidence that total pig iron requirements as well as iron ore requirements have been under-estimated; to avoid confusion adjustments have not been made to compensate for these errors.**

	83 Billion Dollar Level		89 Billion Dollar Level		94 Billion Dollar Level	
	No. of Mills	Rated Cap. (Millions of G. T.)	No. of Mills	Rated Cap. (Millions of G. T.)	No. of Mills	Rated Cap. (Millions of G. T.)
SHEET MILLS						
As Reported	4	2	7	3.4	10	4.7
As Revised	None	None	2	0.8	4	2.1
BARS						
As Reported	None	None	None	None	3	1.3
As Revised	None	None	None	None	None	None
STRIP						
As Reported	1	0.4	1	0.7	2	1.2
As Revised	..	0.2	1	0.5	2	1.0
TIN PLATE						
As Reported	..	0.2	1	0.7	2	1.1
As Revised	None	None	None	None	None	None
TOTAL ROLLED STEEL PRODUCTS						
As Reported	5	2.6	12	5.7	23	11.6
As Revised	..	0.2	4	2.2	13	6.4

Thus, it becomes apparent that when the capacity of the steel industry is considered correctly, the picture becomes completely different. But, it is not particularly surprising, that Paradiso and Means are confused on the question of steel capacity—for, due to publication of figures for both "practical" and "theoretical" capacity in 1925 and 1926 by the American Iron and Steel Institute, and the subsequent wording of the report recommending the discontinuance of this practice, considerable confusion has arisen among the strictly theoretical students as to what the actual practical capacity of the industry might be. It is hoped that the footnote reference on page 27 will clear up this confusion.

The Paradiso-Means study also blundered with regard to coke requirements for the ingot expansion so blithely recommended. Two errors are apparent.

(1) Coke necessary in ferro-alloy furnaces was not included in the estimate.

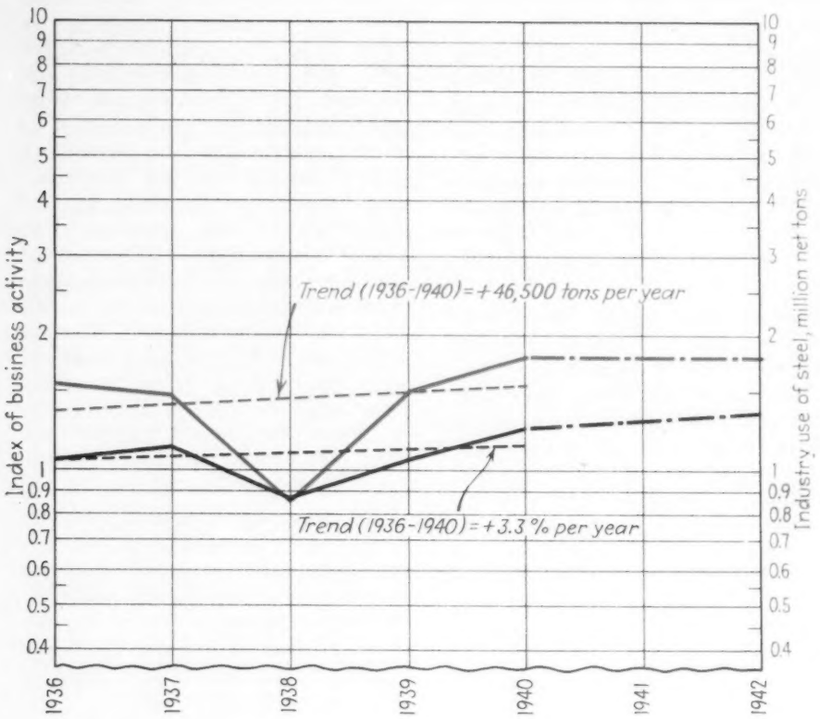
(2) There was a failure to recognize that in all probability the utilization of present beehive capacity would remain fairly constant at high levels of consumer income so that the entire increase would probably be taken up by by-product ovens. As a result, the estimates of additional capacity required should be revised as follows:

	83 Billion Dollar Level		89 Billion Dollar Level		94 Billion Dollar Level	
	No. of Units	Rated Cap. (Millions of N. T.)	No. of Units	Rated Cap. (Millions of N. T.)	No. of Units	Rated Cap. (Millions of N. T.)
As Reported	0	0	800	7.0	1909	22
As Revised	660	4.3	1660	10.8	3700	24

The ramifications and fine points of collection, preparation and trading in scrap iron and steel baffles practically everyone at times, and Messrs. Paradiso and Means are no exception to the rule. Serious under-estimate of the steel scrap situation shows up in the report. The bland statement that "there probably would be no difficulty about getting sufficient scrap" at high consumer income levels is a grave error unless price is to be no consideration.

Cost Assumptions Err Badly

Due chiefly to grossly underestimating the cost of modern rolling mills, and overlooking the intermediate or semi-finishing mills as



Household, Office and Institutional Equipment and Appliances

Year	Business Week Index of Business Activity	Industry Use of Steel (Thousands of Net Tons)
1936 (actual)	104.7	1,583
1937 (actual)	111.9	1,494
1938 (actual)	86.0	868
1939 (actual)	106.1	1,525
1940 (actual)	124.0	1,800
1941 (estimated)	130.0	1,800
1942 (estimated)	135.0	1,800

Principal Steel Products Involved and Approximate Percentage of Total Domestic Use of Each Product

		Net Tons in 1939
Bars, small shapes	= 3% =	123,300
Tin and black plate	= 2% =	44,700
Sheets	= 13% =	932,700
Strip	= 6% =	122,000
Pipe, tubing and wire	= 4% =	224,600
All other	= 6% =	63,600

Industry total = 5 per cent, representing 1,524,700 net tons in 1939.

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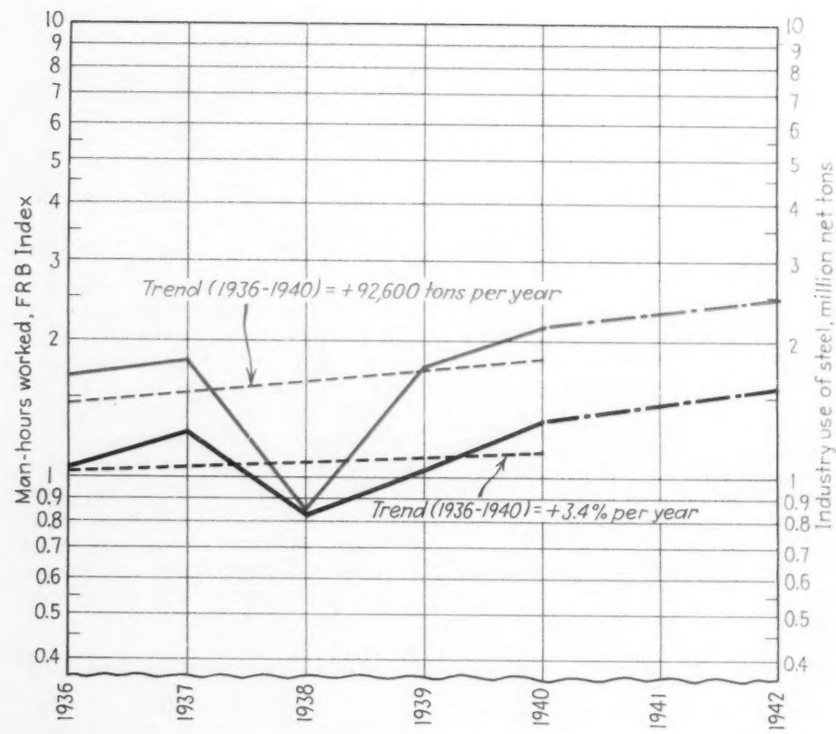


Industrial Machinery and Tools

Year	Man-Hours Worked in Machinery Mfg. Plants (FRB Index)	Industry Use of Steel (Thousands of Net Tons)
1936 (actual)	105	1,680
1937 (actual)	126	1,804
1938 (actual)	82	831
1939 (actual)	104	1,790
1940 (actual)	133	2,150
1941 (estimated)	145	2,350
1942 (estimated)	160	2,500

Principal Steel Products Involved and Approximate Percentage of Total Domestic Use of Each Product

		Net Tons in 1939
Structural shapes	= 4% =	96,000
Plates	= 8% =	181,900
Bars, small shapes	= 12% =	504,400
Sheets	= 7% =	499,300
Strip	= 5% =	114,100
Pipe, tubing and wire	= 5% =	296,100
All other	= 9% =	92,200

Industry total = 6 per cent, representing 1,790,100 net tons in 1939.

well as other general facilities, which would have to be considered in connection with any expansion of rolling mill requirements, the estimated cost of additional units is in error. Assuming the industry today to be fairly well-balanced as to coke, pig iron, ingots, and finishing capacity, additional requirements, exclusive of ore, coal, and transportation facilities, under each of the hypothetical consumer income levels, would have to be revised as follows, if the reported estimates of additional steel requirements were accepted:

	83 Billion Dollar Level	89 Billion Dollar Level	94 Billion Dollar Level
As Reported	$315,960,000	$720,170,000	$1,217,565,000
As Revised	1,530,000,000	2,810,000,000	3,960,000,000

Assuming that the additional ingot capacity estimated in the report over and above that which would be absorbed by the estimated additional mills required could be used by existing mills, in other words, that the present facilities of the industry are unbalanced, the estimated costs should be revised approximately as follows:

	83 Billion Dollar Level	89 Billion Dollar Level	94 Billion Dollar Level
2nd Revision	$583,000,000	$1,156,000,000	$2,126,000,000

To take care of all errors in equipment estimates, but still accepting the hypothetical assumptions with regard to the levels of income, the approximate revised figures would be as follows:

	83 Billion Dollar Level	89 Billion Dollar Level	94 Billion Dollar Level
3rd Revision	$23,900,000	$1,200,000,000	$2,300,000,000

The report bases its findings on three assumed levels of consumer income in 1941: 83 billions of dollars, which was arrived at by extending the trend line through the peaks of iron and steel production during the last forty years and estimating the level of economic activity which would bring iron and steel production back on the trend indicated; 89 billions of dollars, a level which would mean "practical" full employment (about 2 million still unemployed); 94 billions of dollars, representing an estimated level of complete employment. (All three levels are computed in 1936 dollars.) There is the further assumption that these levels will be maintained over sustained periods of time.

Income Levels Over-Emphasized

Then, using multiple correlation techniques, the report relates past fluctuations in iron and steel production with those in consumer income and, therefore, obtains an estimate of the capacity requirements which would be necessary to produce the steel demanded in a boom year at the peak of the business cycle. This procedure may be questioned on two grounds:

(1) Rates of production reached at the peak of a cycle are considerably in excess of those which would be necessary for a continuously maintained high level of business activity; particularly is this true in the steel industry since durable goods such as steel are produced in cyclical depressions at a lower rate than they are consumed by wear and obsolescence, and in boom times are produced at a higher rate than they are consumed.

2. The level of production attained at such peaks of business activity are further inflated when related to sustained levels of income since, historically, approximately 10 per cent of the production peaks in the iron and steel industry has represented production for inventory.

Also, the relationship derived from the three assumed levels of consumer income are computed on projected 1941 trends and the findings of the report are summarized in a table headed in part: "additional capital equipment required by 1941 for each of three levels of consumer income." The following two questions therefore arise, first, as to whether these consumer income levels can be attained by 1941

Determination of Rated Capacity in the Steel Industry

The American Iron and Steel Institute's report in 1927 on rating of capacity, reads as follows: "Your committee has concluded, after two years' experience, that to publish two capacities for the same product makes for confusion. It, therefore, now recommends that all figures of 'practical capacity' be abandoned and that the only figures published be the results of the annual survey of capacity and that this be called 'capacity' instead of 'theoretical capacity.'"

In addition, as the Resources Committee points out, "The Annual Statistical Report of the Institute for 1938 presents comparable data from 1925 to 1938 on blast-furnace capacity and steel-ingot capacity. For the year 1925 the capacities given agree with the estimates of theoretical capacity, that is, without making adjustments for necessary shut-downs, as estimated by the committee."

In view of these facts, a resume of the development of the procedures now used to determine the published capacity figures for the industry is presented:

The Special Survey of Capacity as of Dec. 31, 1925, made to determine "practical" capacity was made under instructions to reporting companies that "The figures of capacity desired are your practical capacity. That is, an output which you feel can be attained under conditions of maximum demand, assuming adequate transportation service and no serious labor shortage. You are especially requested to base your figures on your usual number of operating turns per week; and to make due allowance for such holidays as you customarily observe, as well as for average time lost for repairs, relining and for rebuilding of furnaces."

Data submitted on survey blanks, supporting the claimed capacity showed averages for each size of open hearth furnaces covering "tons per heat," "heats per week," "turns per week," and "greatest actual output (total) in first six months of any year since Jan. 1, 1916, and in second six months of any such year" for open hearth plants.

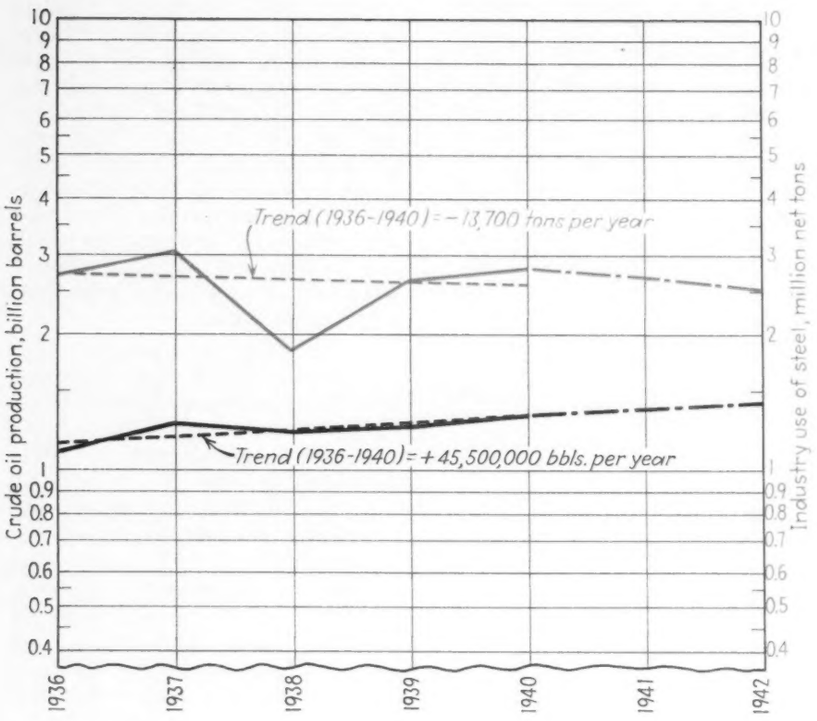
For blast furnaces data submitted included "greatest production for any one month since Jan. 1, 1916, with all furnaces in operation," "greatest production for any six months and any calendar year since Jan. 1, 1916." Yearly capacity was to represent "a production that you believe you can actually attain."

The same information was requested in support of capacity claimed as of Dec. 31, 1926.

The special surveys for 1925 and 1926 became regular annual surveys for the years 1927 to 1932 inclusive, these surveys being the bases for industry capacity totals as published by the institute. They carried the same instructions as to allowances for shut-downs as the 1925 and 1926 surveys of practical capacity. Therefore while the institute dropped the use of the terms "practical" and "theoretical" in 1927, the returns subsequently made by reporting companies represented "attainable" capacity under conditions of maximum demand, based on actual past performance.

The surveys which have been made, starting with September, 1933, and annually since, as of Dec. 31, have been more specific in that data was supplied for each individual blast furnace and each open hearth furnace in the plant, and for each furnace the percentage of "gross" capacity deducted for "lost time" was indicated. The "gross" capacity in all cases was supported by previous actual performance on the respective stack or open hearth furnace.

It should be evident from the above that the institute's published totals of blast furnace and steel works capacity have made allowances for "lost time" and therefore the further deductions for lost time made in the study under review, 10.9 per cent for blast furnaces and 10.7 per cent for open hearth furnaces are not warranted. In no year of the past two decades has maximum demand for steel extended over the full year, but the rate of production at the peaks has shown that the capacity is attainable. In the last two months of 1940 November and December production of open hearth steel was 95.2 per cent of the Dec. 31, 1939, capacity.



Oil, Gas, Water and Mining

Year	Crude Oil Production (Million Barrels)	Industry Use of Steel (Thousands of Net Tons)
1936 (actual)	1,100	2,684
1937 (actual)	1,279	3,034
1938 (actual)	1,214	1,820
1939 (actual)	1,264	2,665
1940 (actual)	1,335	2,800
1941 (estimated)	1,380	2,650
1942 (estimated)	1,425	2,500

Principal Steel Products Involved and Approximate Percentage of Total Domestic Use of Each Product

		Net Tons in 1939
Rails	= 4% =	47,700
Track accessories	= 6% =	35,600
Structural shapes	= 6% =	148,700
Plates	= 7% =	175,900
Bars, small shapes	= 3% =	113,400
Concrete bars	= 2% =	24,200
Tin and black plate	= 1% =	25,500
Sheets	= 2% =	139,000
Strip	= 1% =	14,700
Pipe, tubing and wire	= 32% =	1,786,000
All other	= 15% =	154,600

Industry total = 9 per cent, representing 2,665,300 net tons in 1939.

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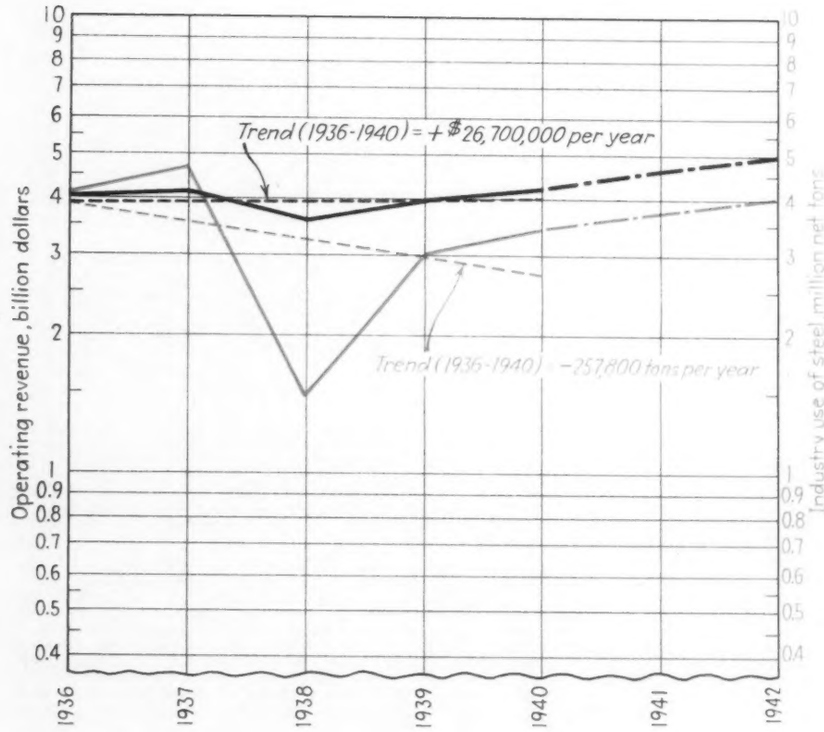


Railroads and Equipment

Year	Gr. Oper. Revenue of Class I Railroads (Million Dollars)	Industry Use of Steel (Thousands of Net Tons)
1936 (actual)	4,051	4,082
1937 (actual)	4,166	4,686
1938 (actual)	3,565	1,444
1939 (actual)	3,995	3,072
1940 (actual)	4,270	3,450
1941 (estimated)	4,635	3,700
1942 (estimated)	5,000	4,000

Principal Steel Products Involved and Approximate Percentage of Total Domestic Use of Each Product

		Net Tons in 1939
Rails	= 94% =	1,117,600
Track accessories	= 89% =	539,500
Structural shapes	= 9% =	234,400
Plates	= 20% =	485,200
Bars, small shapes	= 6% =	231,500
Sheets	= 2% =	143,400
Strip	= 2% =	41,200
Pipe, tubing and wire	= 1% =	57,500
All other	= 22% =	220,400

Industry total = 10 per cent, representing 3,071,800 net tons in 1939.

and, second, whether the past correlation of consumer income to industrial production and iron and steel production can be maintained under the pressures that would exist with such rapidly accelerating consumer income.

(1) Insofar as current estimates are available only the 83 billion dollar level is in the realm of probability in 1941. Consumer income might reach 89 billion dollars in 1942, while the 94 billion dollar level seems impossible to attain within such a short period of time; any conclusions with respect to the latter are, therefore, purely hypothetical.

(2) The possibility of the following intervening factors creating a ceiling retarding industrial production and iron and steel production in relation to consumer income may be applied to an 83 billion dollar level in 1941 and an 89 billion dollar level in 1942.

(a) The principal retarding factor is recognized and mentioned in the report: "At high levels of activity, a bottleneck might arise because of lack of adequate labor supply to produce the products of the industry, to build the required additional equipment within reasonable time, and to manufacture the various finished goods in which iron and steel products are used." The report continues, "No attempt is made in this report to consider these problems . . ." *This is a serious omission and affects the validity of the study for practical purposes.*

(b) Problems of an impending nature also will be involved in the distribution of the greatly increased output of goods.

(c) The fiscal policy of the government can be a factor since the stimulus for achieving high levels of consumer income at the present time arises from the national defense program; increased national income, government sponsored, can only be fully effective if deficit financing is continued. Baby defense bonds, sold to individuals through high-pressure campaigns, thus limiting the spending of increased income, will have a retarding influence.

(d) Restrictive Federal Reserve policies may also intervene.

Over and above all that has already been said, it must be reiterated at this point that estimated levels of consumer income in the report are compiled in 1936 dollars; spiraling costs of living may require much higher levels in 1941 or 1942 dollars to equal the levels estimated in the report.

Other Errors and Omissions

The report is also replete with errors, omissions and questionable procedures which, while important in many respects, do not affect the conclusions of the report as much as those previously reviewed. A few examples may be cited.

Using varied correlation techniques, the report attempts to establish a time-trend adjusted relationship between the consumption of ten different categories of finished steel products and data on consumer income or an index of industrial production.

This procedure is peculiar in two respects.

(1) Six separate time series are used which might be justified if the series applied to a particular produce covering a period during which significant long term trends were developing. However, this is not the case.

Sheets and strip are both largely consumed by the automobile industry; yet the time series for sheets is 1929-37 and for strip 1923-37. Strip shows such rapid acceleration in the relationships established that when projected to 1941, *more strip is estimated consumed at the low 50 billion dollar level than in the boom year* 1929.

Plates and shapes, two items closely related in consumption requirements, have time series of 1929-37 and 1924-37, respectively.

(2) The choice of consumer income data in some cases and the industrial production index in others does not seem to be based on logic in all cases.

Relationships with consumer income are determined for plates, shapes, skelp, and rails and with industrial production for sheets, black plate, wire rods, and bars. It is difficult to reconcile the establishment of the relationship between black plate, an item largely used to produce tin cans (a consumers' perishable good) and sheets used in automobiles (a consumers' durable good) with an index of industrial production; and rails, shapes, skelp and plate (all used in heavy industry) with data on consumer income. Perhaps better "fits" were obtained, but since the report presumes to predict the level of industrial production that will result at each projected level of consumer income, the whole procedure is far from logical. The conclusion that no rails, shapes or plates would be produced at a projected 1941 consumer income of 50 billion dollars rules out reason in favor of mathematical fantasy, particularly when compared to the estimates for strip.

Miscellaneous Errors

The report shows a certain lack of knowledge with respect to the technology of steel making. For instance:

"Flue gas" and "sulphide ammoniate" are cited as by-products of the coking process. Presumably "fuel gas" and "ammonium sulphate" were meant.

Certain skilled workmen in the mills would be rather amused to learn that they (the rollers) are heated by blast furnace gas. Apparently the use of this gas under boilers and in gas engines at the mills was referred to.

The statement that the further extension of the duplex process meant an increase in Bessemer capacity easily could have been avoided with a little technical checking.

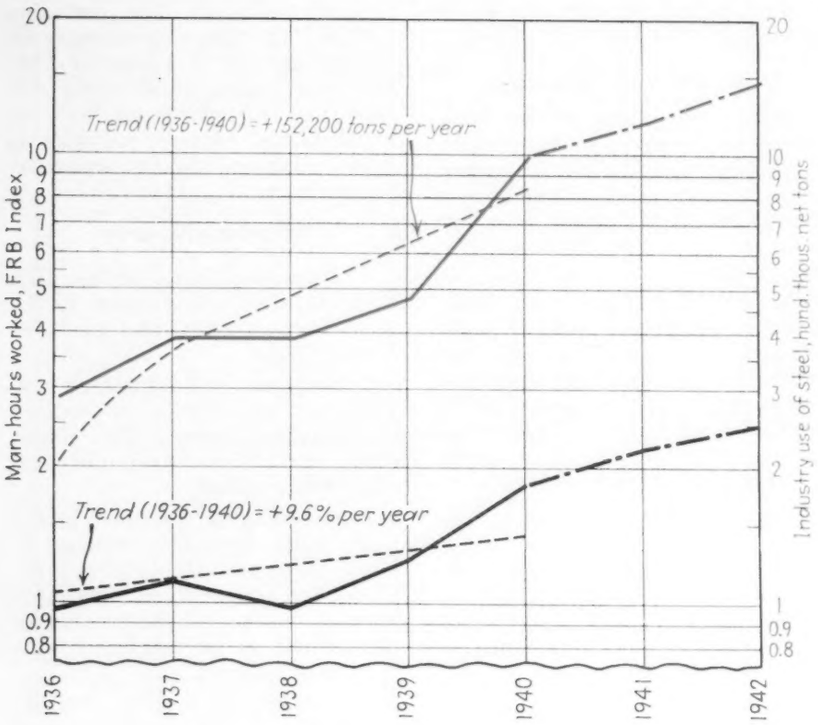
The large chart showing fluctuations in steel production contains a 10 point plotting error for the year 1924.

Checking the ratios of pig iron produced to coke consumed in 1929 and 1937 with the ratios of the estimates for the two products at the projected levels of consumer income in the report would have revealed the error in not including coke consumed in ferroalloy furnaces in the estimates.

Means Forgets Past Mistakes

All these serious errors in the Paradiso-Means report should lay it permanently to rest. Nor should such a disposition be considered excessively harsh; for industrial researchers have come to expect Means' reports to be swamped with basic absurdities.

Back in 1938 Mr. Means was party to a bulky brain-child called "Patterns of Resources Use," which set up so-called correct road maps to chart the future of economic highways, in the form of elaborate mathematical formulae. This report contained so many statistical, economic and logical errors and fallacies that it seemed destined to have little influence. But, now this



Shipbuilding

Year	Man-Hours Worked in Shipyards (FRB Index)	Industry Use of Steel (Thousands of Net Tons)
1936 (actual)	97	288
1937 (actual)	111	391
1938 (actual)	98	390
1939 (actual)	127	489
1940 (actual)	187	1,000
1941 (estimated)	220	1,200
1942 (estimated)	250	1,500

Principal Steel Products Involved and Approximate Percentage of Total Domestic Use of Each Product

		Net Tons in 1939
Structural shapes	3%	76,400
Plates	14%	316,500
Bars, small shapes	1%	33,200
All other	3%	25,200

Industry total = 2 per cent, representing 489,400 net tons in 1939.

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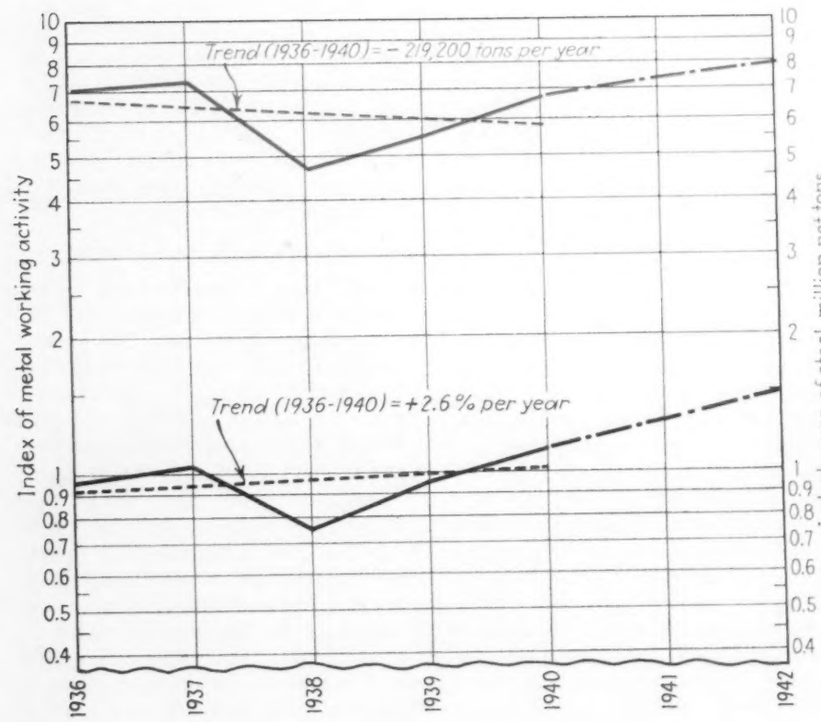


Miscellaneous Industries

(Including pressing, stamping and forming not otherwise allocated)

Year	Metal Working Activity (Steel's Index)	Industry Use of Steel (Thousands of Net Tons)
1936 (actual)	96.2	7,000
1937 (actual)	103.9	7,332
1938 (actual)	74.9	4,695
1939 (actual)	96.1	5,540
1940 (actual)	113.0	6,800
1941 (estimated)	130.0	7,400
1942 (estimated)	150.0	8,000

Principal Steel Products Involved and Approximate Percentage of Total Domestic Use of Each Product

		Net Tons in 1939
Rails	1%	16,200
Track accessories	3%	15,900
Structural shapes	3%	84,300
Plates	12%	289,800
Bars, small shapes	26%	1,067,600
Concrete bars	4%	37,500
Tin and black plate	5%	114,200
Sheets	16%	1,225,400
Strip	21%	441,600
Pipe, tubing and wire	38%	2,064,200
All other	18%	183,000

Industry total = 18 per cent, representing 5,539,700 net tons in 1939.

same technique is employed to demand that the steel industry spend hundreds of millions of dollars to take care of what Means sees in the future; and hysteria on armament work is dragged in to popularize the conclusions.

The absurdities of peering into the future via Means' formulae were particularly well described by John W. Scoville (Chrysler Corp.) before the Cowles Commission for Economic Research, Colorado Springs, July, 1939. Here are some typical examples.

According to Mr. Means' "Patterns of Resource Use" technique, when the country reaches a 100 billion dollar national income level, then automobile output will be nearly 13,000,000 units a year. Since the average life of automobiles is about nine years, this would give the country in a few years about 117,000,000 automobiles in use, or nearly four to a family. But, the same Patterns technique would indicate gasoline consumption of 900,000,000 bbls.—so each of the cars must be driven only 3500 miles per year, or the cars redesigned to go about 42 miles on a gallon of gas. The Patterns technique for the same period allows for 1,705,000,000 bbls. of crude oil output which falls far short of that required to make the gas. So it looks as if there will not be enough crude oil to make the gasoline, and not enough gasoline to drive the cars.

Mr. Means' Patterns technique yields other fantastic results. With a national income of 100 billion dollars, iron and steel consumption would increase 242 per cent, copper 429 per cent, passenger car production 200 per cent, construction 430 per cent, while recreation and amusement would increase only 66 per cent, the number of domestic servants would increase by only 54 per cent, butter and cheese consumption would increase by only 47 per cent, the number of professional persons would be increased by only 12 per cent and the number of school teachers would increase by only 8 per cent. In others words, if the nation becomes rich to the tune of 100 billion dollars, it would cover these 48 states with houses and articles made of iron, copper, lead and zinc, and only slightly increase the amount spent for medical service, domestic help, amusements, education, and better food. Of course, these conclusions are not consistent, either with human desire or social progress.

But when Means a few weeks ago said that the steel industry must increase its capacity by millions of tons as predicated on a national income of so much, or so much for 1941 and 1942, he stirred up an unholy brew. Half the newspapers in the country and professional viewers-with-alarm were ready to lynch steel makers, as deliberately sabotaging rearmament and propagating fifth column activities—all because they claimed to have enough capacity already.

What Will 1942 Bring?

The question naturally develops as to whether the steel industry is exhibiting dangerous over-caution. Will there be enough steel for 1942? Of course, if Mr. Means' gaze into the future is so hyperopic there is danger of others suffering from comparative myopia on looking into the same future.

In an attempt, therefore, of laying the ghost of steel shortage, THE IRON AGE herein peers at 1942, the basic assumption being that the war is at that time still in full flood. This projection into a future economic situation is done with due humility and reservation—but two years is far from a hopeless extrapolation, and there are some excellent basic data to use as a springboard. And, also, this study of THE IRON AGE affords Messrs. Paradiso and Means opportunity for a return bout, if they so desire.

First, what of the past? The graphs and data on pages 22, 24, 26, 28 and 30 cover the experience of the American steel industry over the five-year period 1936 to 1940 inclusive. *All* finished steel consumption during this time is allocated to ten major classifications (see graphs), plus export and (after 1939) Defense Program requirements. These data come from the yearly surveys of THE IRON AGE, which figures have been considerably improved by having the output of converting and processing industries and the distribution through jobbers broken down into the 10 major classifications. This allocation of previously undistributed tonnage back into consumer industries was carried out by Marion Worthing, and appeared in testimony before the T.N.E.C. last year.

The trend lines for the various industries, for the period 1936-1940, are of peculiar interest in that they demonstrate undramatic technological changes that are taking place, but which are usually ignored by outsiders.

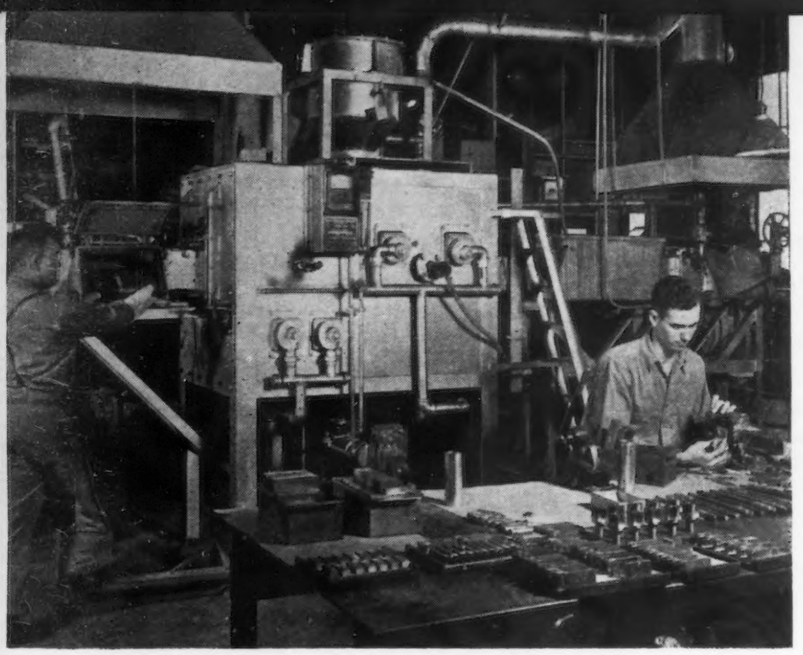
For instance, consider Agricul-

(*Continued on page* 87)

Estimated 1942 Consumption of Hot Rolled Steel Products (NET TONS)

	Merchant and Concrete Bars	Plates	Shapes	Sheets	Strip	Tin and Black Plate	Rails and Track Accessories	Pipe Tubing and Wire Products	All Other	Ingots and Semi-Finished, Export Only	Total
Agriculture	385,000	55,000	55,000	320,000	76,000	neg.	neg.	190,000	19,000	.....	1,100,000
Automotive	1,440,000	120,000	59,000	2,880,000	1,260,000	neg.	neg.	180,000	61,000	.....	6,000,000
Construction	1,425,000	818,000	2,175,000	1,225,000	135,000	70,000	neg.	816,000	136,000	.....	6,800,000
Containers, light	neg.	neg.	neg.	475,000	85,000	2,185,000	neg.	28,000	27,000	.....	2,800,000
Household equip. and app.	162,000	18,000	neg.	1,080,000	145,000	52,000	neg.	270,000	73,000	.....	1,800,000
Ind. Machy. and tools	700,000	250,000	125,000	700,000	175,000	neg.	neg.	424,000	126,000	.....	2,500,000
Oil, gas, water and mining	125,000	175,000	150,000	125,000	neg.	25,000	75,000	1,700,000	125,000	.....	2,500,000
Railroads	320,000	640,000	320,000	160,000	40,000	neg.	2,160,000	80,000	280,000	.....	4,000,000
Shipbuilding*	105,000	945,000	240,000	45,000	neg.	neg.	neg.	75,000	90,000	.....	1,500,000
Miscellaneous and all others	1,600,000	400,000	160,000	1,750,000	650,000	250,000	neg.	2,900,000	290,000	.....	8,000,000
Total Domestic	6,262,000	3,421,000	3,284,000	8,760,000	2,566,000	2,582,000	2,235,000	6,663,000	1,227,000	.....	37,000,000
Export (based on 1940 experience)	1,050,000	560,000	350,000	700,000	100,000	450,000	225,000	560,000	205,000	2,800,000	7,000,000
Defense Program needs, (estimated)	2,800,000	900,000	785,000	1,700,000	395,000	225,000	560,000	560,000	75,000	.....	8,000,000
GRAND TOTALS	10,112,000	4,881,000	4,419,000	11,160,000	3,061,000	3,257,000	3,020,000	7,783,000	1,507,000	2,800,000	52,000,000

(*) Merchant marine only. Naval figures in Defense Program needs.



Operator (left) placing loaded tray of tools into furnace. Trays are manually pushed through the furnace and discharged at opposite end. Other operator is wiring carbide tip and copper to shank.

Carbide Tools Brazed at Low Cost

By W. S. MORSE
President, Morse Tool Co., Inc., Detroit

THE constantly increasing popularity of cemented carbide cutting tools has prompted new methods of manufacture to step up production and reduce costs.

Cementing of the carbide tip through brazing has been one of the factors which has retarded quick and mass production, adversely influencing production cost and therefore selling price.

In order to do a satisfactory job of brazing, an absolutely clean surface is essential. In addition, there is the problem of preventing decarburization of the high carbon shank at the high temperatures required for brazing. Before the days of the controlled atmosphere furnace, fluxing the entire tool had to be resorted to. And, while this gave a satisfactory job, the individual hand dipping and subsequent grinding off of the flux and excess copper was a laborious, time consuming and costly job.

The development of the fuel fired muffle and electric furnace using a hydrogen atmosphere has been a vast improvement over older methods. However, the relatively high cost of hydrogen and a possible danger of explosion have left something to be desired.

Recently the Morse Tool Co., Detroit, installed a semi-continuous furnace, designed and fabricated by Surface Combustion Corp., employing an inexpensive atmosphere which is produced from charcoal in a self-contained generator.

The atmosphere is known as Char-Mo atmosphere and was originally developed a few years ago for heat treating a complete range of high carbon and alloy steels without scale or decarburization. The atmosphere is composed of approximately 2/3 nitrogen and 1/3 carbon monoxide with only infinitesimal traces of water vapor and carbon dioxide. Since the only combustible in this gas is the slow burning carbon monoxide which is diluted with two parts of inert nitrogen, the possibility of an explosion is practically nil.

The generator which forms a part of the furnace and which requires no separate heating, consists of a refractory tube which passes vertically through the furnace between the muffle and furnace wall. The top of the tube is above the furnace and is connected to a hopper for charcoal. The bottom of the tube is below the furnace and is connected to a simple ash remover. Air (from the same blower used to supply combustion air to the burners which heat the furnace) is introduced near the bottom of the tube. As the air passes up through the tube, it reacts with the incandescent charcoal in the tube and forms a gas ideally suited for brazing.

This gas is taken from the generator at a carefully predetermined distance from the top of the tube. That portion of the tube above the take-off point is used to condition the green charcoal, making it possible to use inexpensive commercial charcoal. The portion of the gas passing through the tube above the take-off point is burned at top of the furnace.

The furnace proper is gas-fired and consists of a preheat zone, a heating or brazing zone, and a cooling zone. In addition to the brazing zone, the preheat zone is also equipped with burners. However, these burners are seldom used except when starting the furnace or when running heavy loads. The cooling zone is water jacketed to facilitate rapid cooling. The protective Char-Mo gas is introduced into all three chambers.

The tools are placed on open trays and manually pushed through the furnace. Loading and unloading take place through side doors. The furnace produces on an average of 2000 pieces per 16 hr. The cycle is 1½ hr., consisting of 15 min. preheat, 5 min. braze, and 70 min. for cooling.

When brazing an average of 2000 pieces in 16 hr. the amount of charcoal used is 50 lb. With charcoal at 2¼c. per lb. the cost of the atmosphere is $1.12 for 16 hr. or an average of 2000 pieces.

Summing up the advantages of this new atmosphere furnace, it can be said that the atmosphere employed is of very low cost and is safe. The semi-continuous or straight-through feature of the furnace permits mass production and prompt delivery of special orders.

Automatic Arc Welding

—Is now being used for large machine structures, singly engineered, where the footage of welds produced is large and where the traverses do not depart materially from horizontal straight lines.

AUTOMATIC arc welding, at first thought, would appear to be a process adaptable chiefly to mass production industries, like the automotive industries where the repetitive operations on large quantities of identical assemblies warrant the added cost of special set-ups. The arc welding of banjo rear axle housings is a typical example. Yet the process is logically applicable from an economic viewpoint to large machine structures, singly engineered, where the footage of welds produced is large and where the traverses do not depart materially from a horizontal straight line.

In fact, on structures 50 to 100 ft. long or more, laying of a single bead by hand may take many hours. This also holds for multiple pass work on heavy structures of shorter length. On such work there is considerable loss of time in changing rods, and stub end loss becomes a serious item. Besides quality is variable, due to the human element, and intermediate craters at the end of each rod cycle are difficult to avoid. Continuous welding of this kind lends itself admirably to automatic metallic arc welding. Speed of laying the beads can be greatly increased, a steadier and more uniform arc can be maintained and better fusion is possible because a much higher current can be used for a given diameter of welding wire. Furthermore, cost of material is less because welding wire costs less in coils than in short rod form and the stub-end loss is entirely eliminated.

The problem of coatings, once a serious one, has been successfully solved so that all the advantages of shielded arc welding can be brought to this technique. Ultimate quality of the product is further improved not only by sounder and more uniform welds, but also by minimizing heat distortion since the usual machine set-up for making web to flange connections is to use dual heads working from both sides of the web at the same time.

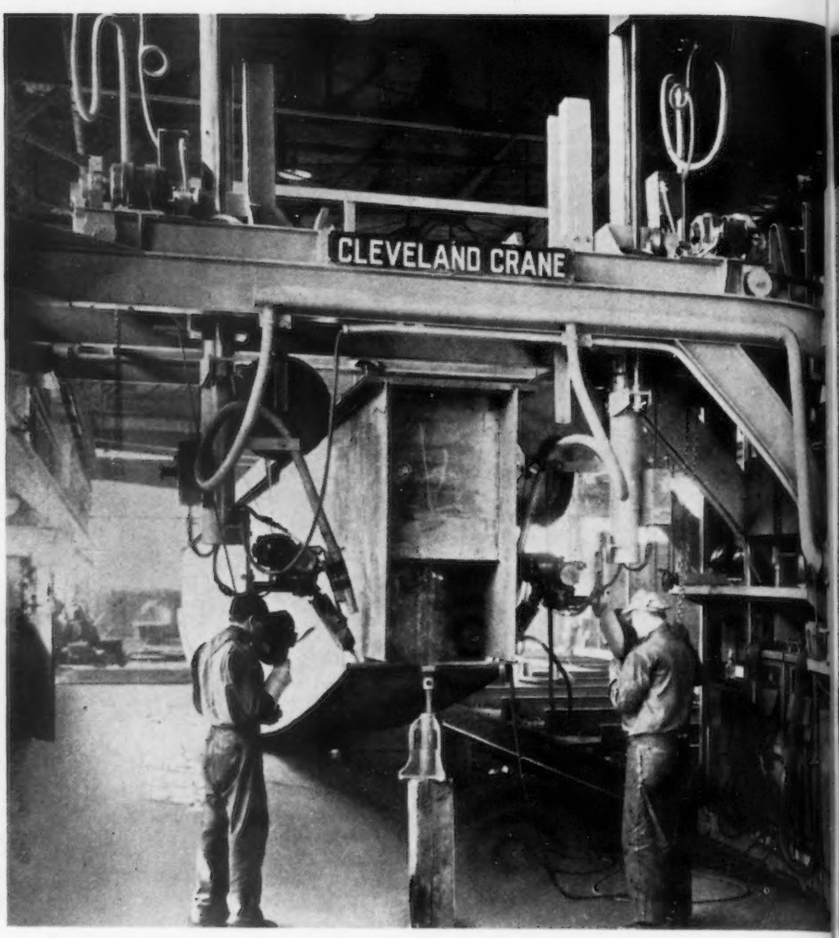
The Cleveland Crane & Engineering Co., Wickliffe, Ohio, was one of the first companies to adopt an all-welded construction for its cranes, and more for quality reasons than anything else began to experiment with automatic arc welding several years ago. Since then the technique has been perfected and the original apparatus replaced by new and heavier equipment modified on the basis of that earlier experience. Fig. 1 shows the single-leg gantry crane on which the two automatic Unamatic welding heads are mounted. The legless side (left) runs along an I-beam supported rail attached to the building wall columns, and the right leg runs along a track flush with the floor. There are drive wheels on both the high rail and the low rail and through a Reeves drive from a motor the speed of traverse may be varied to suit the work being done. With ¼-in. electrodes, the average speed of traverse is 100 ft. per hr. Present capacity is for welding a crane girder 140 ft. in length, but this is limited more by the practical width of crane spans than by the limits of the process. It is always possible to extend the track.

On the gantry are mounted two Unamatic a.c. metallic arc automatic welding heads each supplied from a separate 500-kva. transformer mounted in the gantry leg. Primary current of 440 volts is taken from trolley wires along the wall runway. Cross feed of the heads is effected independently by hand chain pull while vertical travel is by motor driven screws controlled by push button. The shielded arc is used and feed of the wire and the flux tape is automatically regu-

lated to maintain a constant voltage at the arc. This voltage or length of arc can be varied to suit operations conditions. For example, in multiple pass work, a shorter arc is employed on the first pass in order to get down into the corner. Since in fillet welds, the wire is fed toward the fillet at an angle varying from 45 to 30 deg. from the vertical, this type of control is not fully automatic when changes in vertical position of the weld are much more than the average variations in sheared plate, as for example in welding camber portions at the ends of the girders. Here, manual control of the elevation or lowering of the entire head is required, and occasionally adjustment of the cross position of the head carriages or trolleys is needed, particularly on very long work where exact parallelism between work and tracks is not obtainable. In any event, constant operator supervision is essential at both heads.

In the Unamatic metallic arc process developed by Una Welding, Inc., Cleveland, both the fluxing tape and the wire are in coil form and are fed into the weld simultaneously. In the Wickliffe installation, wire is 7/32 or ¼ in. in diameter and for welding mild steel plate is generally of the same composition as the material being welded, mostly SAE 1020. The lightly coated wire is nicked at regular intervals so that it can be fed positively by two knurled, power driven rolls, and is lightly coated to provide additional flux other than what is in the tape.

The feed rolls are operated in unison by two electric motors interconnected by differential gearing. One motor runs at constant speed in one direction, while the other runs in the opposite direction at variable speed, depending upon the voltage across the arc and hence the arc length. The constant speed motor is the "up" drive and tends to withdraw the wire when the speed of the second motor falls below the first. In normal feed the variable speed d.c. motor is operating several hundred r.p.m. faster in the opposite direction from that of the constant speed motor. When both motors operate at the same speed, no feed of the wire takes place. Automatic maintenance of arc length is obtained by connecting the armature of the variable-speed motor in parallel with the arc and in series with an adjustable arc



control rheostat. For any rheostat setting, lengthening of the arc and hence corresponding increase in voltage causes this motor to speed up and the wire to advance more rapidly, thereby reducing the arc length and voltage and hence the motor speed. Too short an arc causes the opposite effect, with the result that there is a constant governing effect on the rate of advance of the electrode.

At start, by means of suitable resistance incorporated in the control panel, the open circuit voltage is cut down to 20 volts when impressed on the d.c. motor armature. This starts the down motor and rapidly advances the wire to the work. When the electrode touches the work, welding current begins to flow, closing a series relay which starts the up motor. Meanwhile with voltage between rod and work reduced practically to zero, the down motor speed decreases, allowing the up motor speed to overcome it and withdraw the wire from the work, establishing the arc which quickly becomes stabilized. Thereafter any irregularity during the welding, either of work or current, is immediately compensated for by an increased or decreased down motor speed. With this type of control a small auxiliary motor-generator set is provided to energize the shunt field of the d.c. motor and to operate the panel relays.

Below the automatic feed head is a so-called taper attachment which takes the flux impregnated tape and by means of a series of forming rolls wraps it lengthwise about the wire much as pipe skelp is formed into an open tube prior to butt welding. By incorporating fine wire in a tight sinusoidal form in the tape, the latter maintains its formed shape around the wire until it is consumed in the arc, giving practically the same shielded arc effect as that obtained with heavy coated rods. At the same time, adequate electrical contact with the wire is effected through a narrow shoe or brush applied by spring pressure just prior to the complete closing of the tape about the wire by the bottom exit nozzle of the taper. This arrangement is shown in detail in Fig. 2.

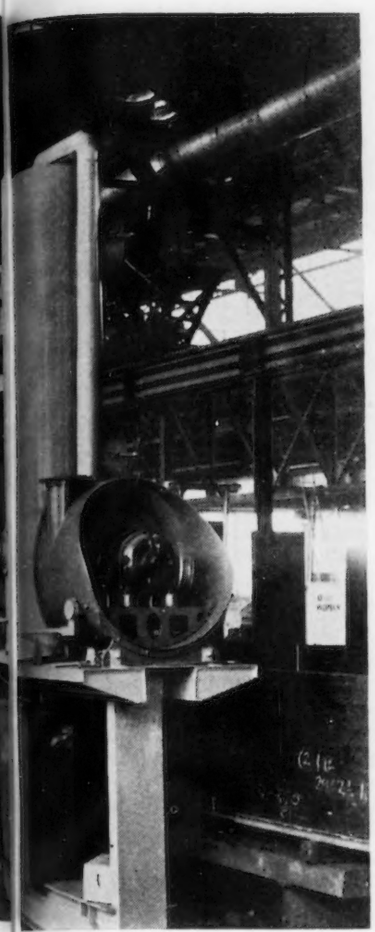


Fig. 1—Simultaneous arc welding of the two side webs to the base plate of a large Cleveland crane girder. Although the Una heads feed the welding wire automatically, it is necessary to provide manual control for power elevation of the heads in following the camber of the girder. Gantry is power driven along the floor.

must be done by hand welding. In fabricating a girder at Wickliffe, the usual procedure is to place the top plate upside down on suitable I-beam horses and with the aid of simple fixtures to tack weld the diaphragms in place by hand. Later, attachment is completed by intermittent fillet welds, also performed by hand.

Next step is to attach the web members to the reinforcing diaphragms with intermittent welds. These operations are also performed by hand. In girders of extreme depth (8 ft. is the limit on the heaviest crane built so far, Fig. 3) it is necessary to lay the girder on its side to facilitate welding of the second web. At that, the operator has to crawl into a confined space 8 ft. deep. This is an extreme case, of course. The average girder is 2 to 4 ft. deep and both diaphragms can be attached to the webs by vertically placed welds. Following this, the bottom plate is laid on top of the upside-down assembly and is tack welded to the webs. Gravity aids in the fitting of this plate to the camber at the ends.

The partly assembled girder, still upside down, is then brought to the automatic welding machine and lined up approximately parallel to the floor track. Outside fillet welds of each web to top plate are then completed at one pass of the heads. By welding simultaneously from both sides heat distortion is avoided. Generally three layers of weld metal are deposited near the ends of the girder. On this multiple pass work welding may be done in either direction of traverse by reversing the gantry crane propelling motor. For long runs, however, time is saved by pushing the gantry rig back to starting position by hand.

After the top welds are completed, the girder is turned over and the web is welded to the bottom plate on each side. Effect of camber at the ends can be handled in one of two ways: Either by leaving the crane girder in its normal position and compensating for the difference in elevation of the weld from point to point by manually controlling the amount of vertical feed on each head, or by tilting one end of the girder so as to make the chord of the arc as nearly horizontal as possible. Manual control of the depth of head travel is still necessary, but the amount of vertical travel is greatly reduced. As has been explained, the mechanism for automatically maintaining arc length is unable to compensate for such large variations in depth.

Aside from use in the fabrication

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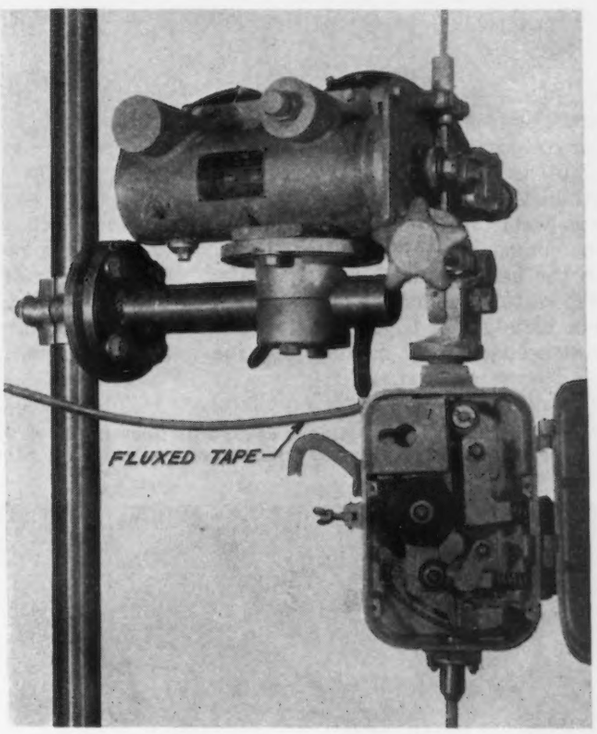

Fig. 2—Close-up of the Una automatic arc welding head. The two motors controlling the feed of the nicked wire are at top right while the tapping mechanism is below. Fluxed tape is fed longitudinally with the wire and is gradually formed about it. The exit nozzle closes the tape after it has passed the contact shoe at the lower right.

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In welding large footages, a necessarily large quantity of fumes is produced due to the action of heat on the flux materials which are composed of minerals and some organic matter. These fumes are in reality very finely divided dust particles which are removed by an exhauster and tubular bag collector made by the Spencer Turbine Co. Flexible exhaust hose connections are strapped to the brackets supporting the tapering attachments on the heads.

Welded crane girders are of box construction with reinforcing diaphragms welded to the two web members and also to the top plate. Much of the inside, short work

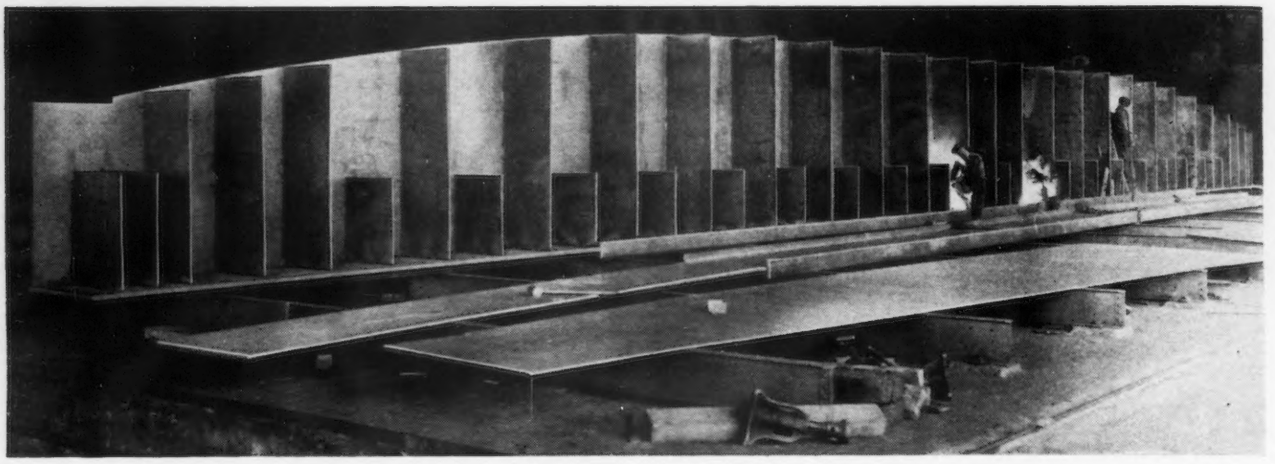
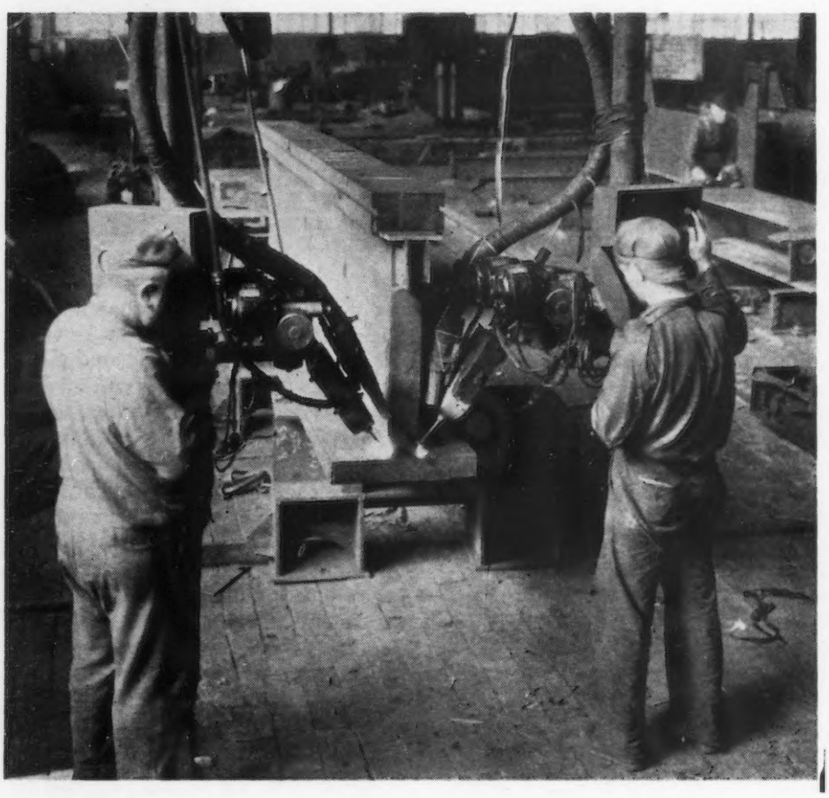


Fig. 3—Diaphragm members must be welded in place by hand prior to automatic welding of webs to base plates. When completed, the girder shown will be the largest all-welded crane girder built until now. It will weigh over 45 tons, have a span of 105 ft. and be over 8 ft. high at the middle.

of crane girders, the semi-automatic welding unit is also available for fabricating the much heavier plate sections encountered in the production of press brakes for the Steelweld Machinery Division of the company. As shown in Fig. 4, on the heaviest machines the main web sections under the die seat may run as high as 5 in. and the die seat section itself may be 6½ in. deep by 12 in. wide. These heavy sections call for flat fillet welds of 1½ in. wide on a side requiring a large number of beads to build up. With hand welding, the temptation would be to use heavy beads to shorten the production time. The automatic process lends itself to the better practice of using a large number of lighter beads and stepping up the speed of depositing metal. This technique produces less heat and hence sets up less stress, eliminating the need for subsequent annealing of the assembly. The advantage of working from both sides of the web simultaneously is obvious. On the 1½ in. fillet mentioned, about 16 beads would be deposited. With bed lengths of 10 to 20 ft. the total bead footage would run between 160 and 320 ft.

Fig. 4—Automatic arc welding apparatus finds an ideal application in multiple bead work on heavy machine bases, such as the Steelweld bending press base shown.



Two 5-ton and one 30-ton girder cranes serve the bay in which the welding gantry crane itself runs. All three overhead cranes have to be brought into service when a really heavy girder is being fabricated. The huge 105 ft. girder pictured, for example, weighs 45 tons complete and actually overtaxes crane facilities when the cast steel wheel housings are finally welded in the ends.

Little plate preparation is required prior to welding, other than shearing or gas cutting. For big work a small portable Oxweld cutting machine is used as it is much easier to bring the machine to the work than vice versa, particularly on very heavy plate—6 to 8 in. thick—or very long plate, since all the main girder members are one piece. A very simple means has been devised for cutting the sweeping arcs that form the camber on the underside of the girder. The guide member for the cutting machine is simply a steel angle in which slots have been cut at about 6 in. intervals on the flat leg. Such an angle can be readily bent to suit the curve laid out in chalk on the plate, and need only be held down by laying weights on it at intervals. Pyrofax gas is the cutting medium.

Casting of Cylinder Heads

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By W. A. PHAIR

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—It's the fins that make this aluminum foundry job one requiring great skill. Herein are operating data as developed by Wright in its new Fairlawn, N. J., foundry

A MASTERPIECE in sand is the complicated aircraft engine cylinder head being cast in dry sand molds in the new aluminum foundry of Wright Aeronautical Corp., Fairlawn, N. J. This is the only foundry in the United States owned by an airplane company where these heads are being successfully produced. Aluminum Co. of America produces somewhat similar heads for other aircraft companies.

The power that can be generated in an aircraft cylinder depends in a large measure upon the ability of the cooling fins to dissipate the tremendous heat generated during combustion. At one point in the evolution of the modern aircraft engine, attempts at increasing the power generated in a cylinder were held up by the problem of providing the additional cooling capacity required by an increase in cylinder power.

These narrow fins which crown the cylinder are not only important from a designer's viewpoint, but they are also important to the foundrymen for, without these fins, the casting of the heads would be a relatively simple matter. With the fins, however, the successful casting of the heads requires a nicely balanced combination of the most modern machine work and very skillful handwork.

It is no military secret that before the casting of these heads was licked, cylinder head production was tending to hold up engine output. At the Fairlawn plant, however, this job has been licked, and production is fast becoming a routine procedure.

These fins, which in the aggregate account for some 3000 sq. in. of cooling surface, range from 1 to 3½ in. in height (see full scale illustration, Fig. 1). The fins are set on 7/32-in. centers and taper from 0.06 in. at the top to 0.09 in. at the point where the fin joins the main body of the head.

Molding of the heads is accomplished in a bay, divided in two sections by an overhead conveyor.

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Fig. 1—Full scale illustration of a section of a cylinder head, showing fin dimensions and depth of fin core which complicates the casting of these heads.

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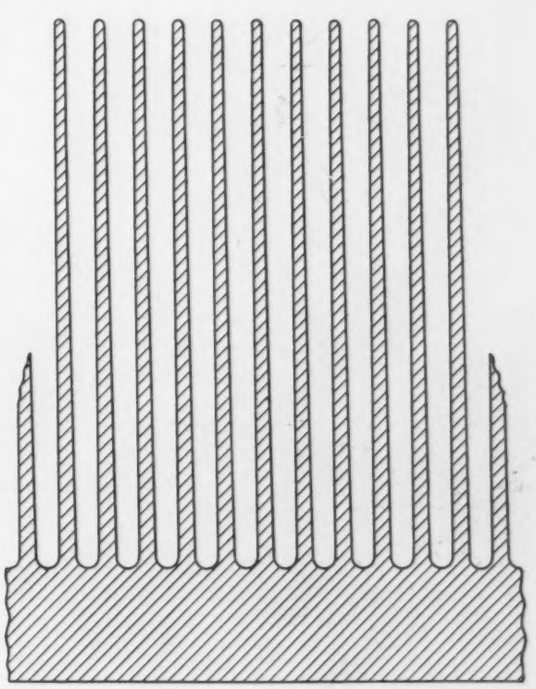

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Fig. 2—Head pattern and mold ready for the conveyor line which will carry the mold through baking ovens.

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Fig. 3—Hand setting of approximately 750 nails to support the fins.

On one side of the conveyor the head cope is rammed up. On the other side the drag is produced.

In making the drag section, the fin voids are filled by hand, the sand being slung in with considerable force. Then the handwork begins in earnest with the inserting of 750 nails in between the fins to support the long fin sand core. These nails are headless finishing nails 3 in. long by 1/16 in. thick.

The flask is then set on and shovel filled and hand rammed. Then follows the jolt, vibrator, draw and patching. A light surface casein spray is added and the mold is placed on the conveyor to be carried through the core oven.

Some notes on equipment and foundry practice may be of interest. Match plates are aluminum and patterns are brass. All flasks are of the same size and each man devotes his entire working day to one pattern only, requiring an average of one hour per mold. Lycopodium is lightly dusted on each pattern before a new mold is commenced.

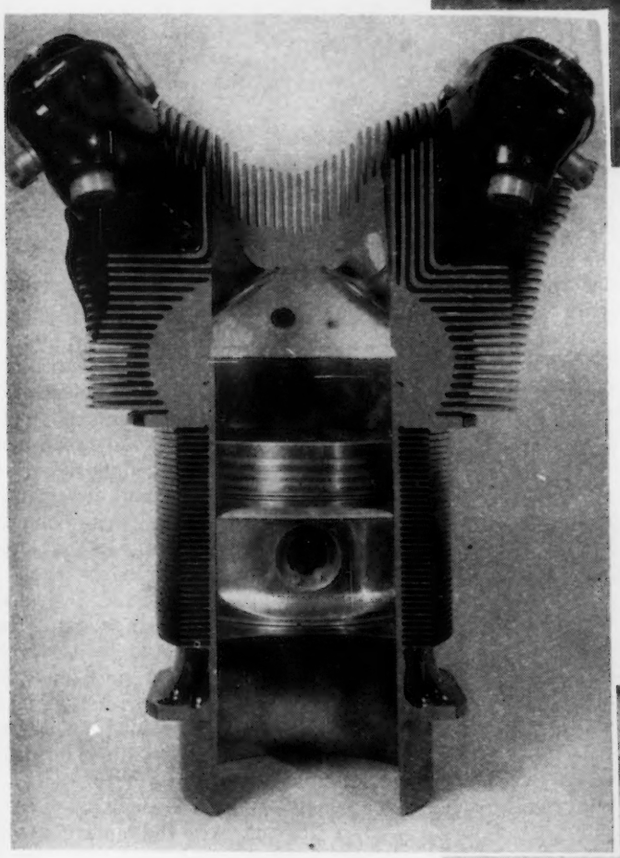
In molding, the pattern is covered to a depth of about 1 in. with a facing sand mixture of Pennsylvania glass sand and No. 80 silica sand and oil. The flask is then filled with backing sand made from a

mixture of Pennsylvania glass sand, No. 80 silica sand, South Jersey molding sand and oil. The cylinder barrel cores are also made of this last mixture. The exact proportion of each ingredient varies considerably, and as any black magic artist will attest, the less said about the proportions, the happier the brew master will feel. The molding machines are Osborne jolt draws.

The trip through the overhead oil fired ovens to bake the mold requires 7 to 8 hr. at a constant temperature of 450 deg. F. Leaving the core conveyor, the molds have the cavities painted with an acetylene torch to build up a small carbon deposit, the two halves joined and the gate cores and pouring basin put into position and poured.

The aluminum alloy—a special Wright alloy containing copper, nickel, manganese, and smaller amounts of chromium and titanium —is melted in five oil fired Monarch furnaces of 1000 lb. capacity.

Experience has shown that the pouring temperature is a very critical factor in keeping foundry



ABOVE

Fig. 5—Dry sand head mold sections and internal cores, preparatory to assembling the complete mold. Workers in background are applying carbon coating.

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LEFT

Fig. 4—Cutaway view of a cylinder assembly showing placement and depth of fins.

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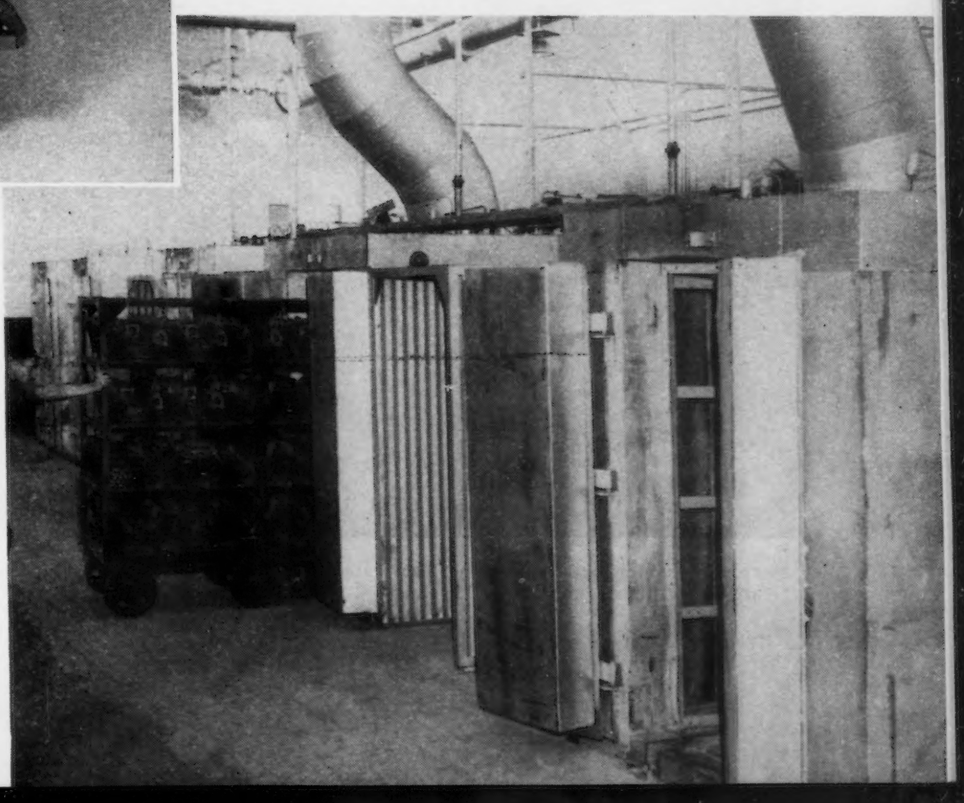
Fig. 6—Ovens used in artificially ageing the castings. This method cuts time required to age the castings from several days to a few hours.



losses to a low level. For this reason extreme care is exercised in pouring only between a range of 1410 deg. and 1420 deg. F. Temperature determinations are made with Foxboro pyrometers.

Melting of a charge takes 90 min. in a hot furnace and 2¾ hr. starting with a cold pot. Before pouring, chlorine gas is bubbled through the metal to remove oxides and gases, notably hydrogen. All scrap is remelted into pigs before mixing with the new alloy material.

The size of gates and risers is especially large on these heads to permit very fast pouring. Weight of the casting after leaving the mold is 70 lb. Removal of gates, cleaning, and snagging with rotary burrs cuts the weight in one-half, and the casting weighs 35 lb. when it leaves the cleaning department. In snagging between the fins, the use of a band saw running backwards has been found effective. Preliminary cleaning takes place in a rotary sandblast table.

After leaving the burring tables, the heads are heat treated for 5 hr. at 960-970 deg. F., followed by cooling with air blasts. This is followed by artificial aging, a practice developed to a fine science at the Fairlawn plant. Aging is done in Gehnrich ovens.

Immediately following the aging operation, the castings are etched to show up cracks. In etching, castings are dipped in a solution of hot caustic soda, followed by a hot water rinse. At this point the head is quite dark. Then, to restore a light color, the heads are passed through a nitric acid solution and a cold water rinse.

The heads are then subjected to a minute inspection and a Brinell test. This Brinell test is a vital factor in determining the fitness of the head. All readings must be within the range of 75 to 90 with 10 mm. ball and 1000 kg. load.

When a cylinder head passes this point, it is as perfect a casting as human ingenuity and mechanical equipment can make it.

Caterpillar a Foremost User of A.C. Arc Welders

WITH a recent purchase of more than 35 G. E. alternating current arc welders, the Caterpillar Tractor Co., Peoria, Ill., has become one of the foremost users of a.c. arc welding equipment in the midwest. Caterpillar now uses nearly 60 such arc welders in fabricating structural shapes as well as cast steel and mild steel.

Up until a few years ago, motor graders and blade graders were maintenance rather than construction machines. But now, with diesel power, they are going more and more into the heavy road construction field. Caterpillar motor graders have even proved to be practical in cutting trenches for pipeline and for the heavy job of terracing farm lands to prevent erosion—in addition to their regular job of heavy ditching, bank sloping, and general road construction.

Caterpillar tractor assembly being fabricated with aid of G.E. 500-amp. a.c. arc welders.

And with the increase in power and strength, it is noticeable that welding is rapidly replacing other forms of fabrication in the building of Caterpillar road machinery. In motor grader construction for instance, the circle and drawbar assemblies are among the integral parts where welding is employed. In addition, heavy parts such as motor and blade grader frames, tandem drive housings and road rollers are fabricated by the welding process with 500-amp. a.c. welders. The drawbar, which is made of ⅝-in. steel, is welded with heavy coated automatic welding heads in straight sections before it is formed. Tractor transmission cases are also constructed entirely with a.c. welders.

The Caterpillar company prefers a.c. welders of the transformer type over d.c. welders for this type of work. For instance, a welding speed of 21 in. per min. is obtained with ¼-in. electrode, operating at 450 amp. and 40 volts. This speed is considerably better than could be obtained with d.c. welders on this work.

It is said that magnetic disturbance of the arc is eliminated by the a.c. arc welders, welds have a better appearance, and operators are trained more easily.

Metal Finishing

—Recent advances in miscellaneous plating developments, organic finishing, equipment and supplies.

TWENTY-FIFTH in a Series of Articles on the Technical and Economic Aspects of Metal Cleaning and Finishing

By ADOLPH BREGMAN
Consulting Engineer, New York

THE plating of indium has made little progress within the past year or two although it seemed at one time to have an interesting future.

The plating of iron has attracted new interest, mainly because of its revival in electroforming for the manufacture of dies and molds for plastics,[68] by the Ekko process. The heavy iron deposits so produced are 50 per cent harder than cold rolled steel, having a Brinell hardness of 240, and when started from the underlying pattern, provide a cathode or die insert that reproduces the shape and surface finish of the pattern in every detail.

Lead has been deposited by Mathers and Forney[69] from a new solution, lead sulfamate. Smooth deposits were induced by addition agents, aloin, resorcinal, etc.

Interest is being shown in the deposition of manganese from sulphate solutions as described by Yankelevich.[70] A patent on manganese plating was taken out by S. M. Shelton.[71]

Several patents were issued on tungsten plating.[72]

Anodic processes seem to be finding new fields of activity. Beryllia can be deposited anodically on silver and copper for protective purposes. A process which continues to make steady progress in commercial application is the anodic oxidation of aluminum, in which aluminum is made the anode with the electrolyte containing chromic acid or sulphuric acid, and in which an oxide film is formed. This film can be built up to relatively high thicknesses, and has high resistance to abrasion and corrosion; also the ability to adsorb dyes, to give not only protective but decorative coatings.

In the production of metal screen by electroforming[73] there is another interesting extension of direct manufacture by electroplating. This product serves the field covered by perforated metals on one hand and woven wire on the other. Electro-deposited screens have the advantages of uniformity in hole diameters and a smooth surface. Such screen, as produced in copper, nickel and other metals, is used in fuel system strainers, loud speaker screens, screens for clock dials, etc.

The electroplating of metals on aluminum by the Travers[74] process continued to grow steadily. Mathers and Blue[75] have developed a method of depositing aluminum from an organic bath containing aluminum chloride and ethyl bromide. By another method patented by Fischer[76] aluminum is deposited from a fused electrolyte at a temperature lower than the temperature of alloy formation.

The hot-dip coating of iron and steel with aluminum continues to move slowly. In addition to the Fink process for producing ductile aluminum coated steel by hot dipping, a process is now under development by the American Rolling Mill Co., but is about ready for commercial introduction.

Electroplating on stainless steel has always presented difficulties, but methods of obtaining deposits upon this material have been described by Wood[77] and Shirley.[78] Shirley reported adherent deposits of copper from acid baths by previously treating the work cathodically in sulphuric acid.

Good adhesion has been obtained for electrodeposits on stainless steel by Buss,[79] by first pickling in hydrochloric acid solutions, then undercoating with iron or zinc plated from acid baths, or with copper plated from an acid copper chloride bath, before nickel and chromium plating.

Interesting progress has been made in the disposal and reclamation of plating room wastes.[80] The object is to prevent the pollution of the surrounding atmosphere and the nearby waters, and also to recover as much as possible of the values from the wastes.

Chromium plating continues to come into more extensive use in the form of hard chromium on dies, rolls, molds, and sliding parts in engines. Chromium plating of small parts in larger volumes, awaits improvement in baskets and the development of economical barrel plating methods. (Figs. 7 and 8.)

One of the most important events bearing upon the electro-

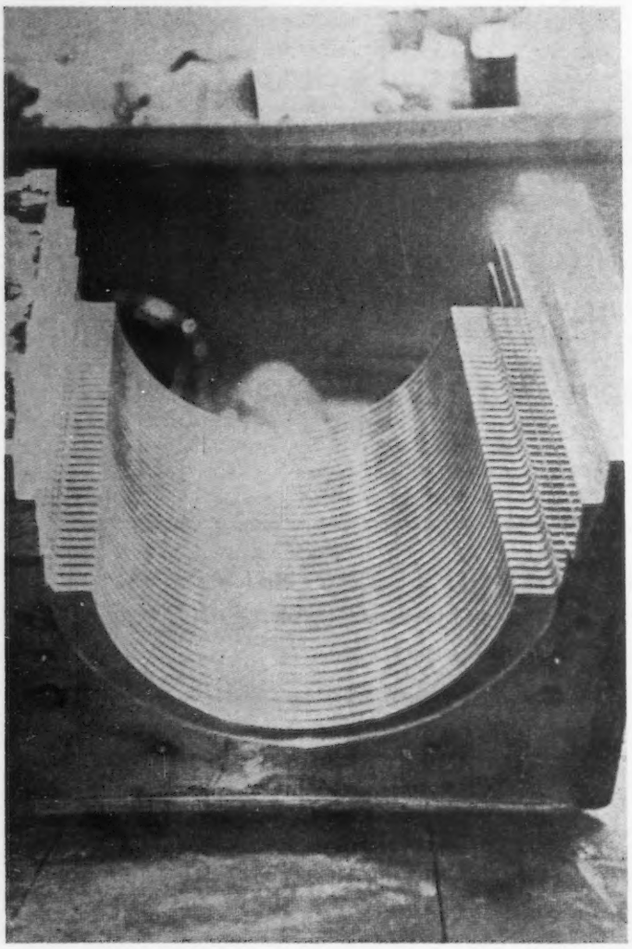


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Fig. 7 — Hard chromium plate on an intricate insert for a record rack. The 40 slots were plated in one operation. Courtesy American Electroplaters' Society.

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plating industry was a decision rendered Nov. 29, 1939, by Judge Barnes in the U. S. District Court in the Northern District of Illinois, Eastern Division, in the case of United Chromium, Inc., plaintiff vs. Great Lakes Plating & Japanning Co., defendant, on the Fink patents for chromium plating. The court upheld the Fink patent No. 1,802,463 referred to as the Bright Plating patent, and also Fink patent No. 1, 581,188, referred to as the Bath patent. No appeal was taken by the defendant.

It is obvious from general conditions at the present time, that at least one of the major outlets for metal finishing equipment will be the airplane industry with its enormously expanded output and its always substantial use of cadmium plating and anodically treated aluminum.

One of the growing sections of the metal finishing industry is the plating on non-metallics. The methods now in use involve the application of a bonding and surfacing coat, that is the application of a conducting film of graphite, copper bronze powder or silver. With the rise in the importance of decoration in consumer products, the electroplating of wood, plaster, leather, synthetic compositions and even textiles, offers a growing field.

Another promising field for electroplating is the deposition of rare metals, in which, of course, the present practice of depositing rhodium is an outstanding forerunner.

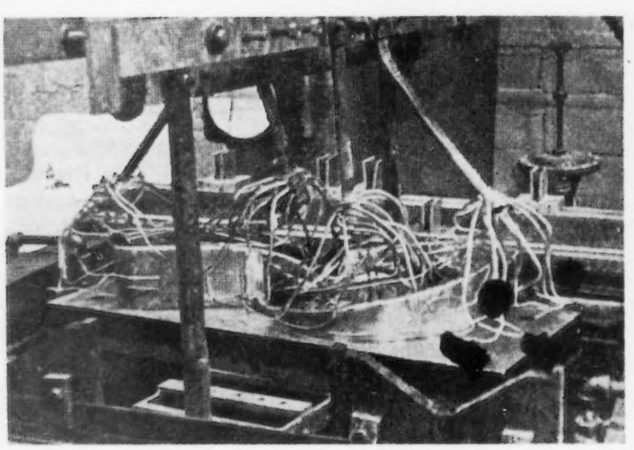

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Fig. 8 — Hard chromium plating a large die for molding plastics, using an "octopus" anode. Courtesy American Electroplaters' Society.

Organic Finishes

Outstanding elements in organic finishes today are (1) the factor of individual applications—"tailor-made" formulations to suit specific purposes, and (2) the demand is for faster drying and more durable coats, polymerized or "cured" at lower temperatures.

In response to that demand, rapid progress has been made in the baked finishes, among which some of the most popular are formulated with urea formaldehyde synthetic resins which bake to almost porcelain hard films in 5 or 6 min. at temperatures from 325 deg. to 350 deg. F. Even at these high temperatures, they retain their white, porcelain-like appearance. Another of their advantages is their high resistance to a variety of solvents. The baking time varies in general, inversely with the temperature, ranging up to 2 or 3 hr. at 200 deg. F. The primer should be clear or neutral in color so that it may be used with any colored top coat.

Other very popular types of resins are the alkyds which it is claimed have, to a considerable extent, displaced porcelain finishes because of their toughness, resistance to grease and stains, and excellent color retention. A useful combination is the urea formaldehyde-alkyd formulation giving hardness of film, abrasion resistance to alkali, water and a number of solvents. These white finishes find an excellent field in reflectors and washing machines. They permit baking schedules of 5 to 10 min. at 350 deg. F., 10 to 15 min. at 300 deg. F., 1 hr. at 275 deg. F., etc. These formulations can be used for colors as well as whites.

Color and metal combinations are highly popular novelty finishes.

Another type of finish gaining

in use is the wrinkled, stippled, spattered or "novelty" finish. In a recently developed process of applying wrinkle enamel to rough castings, the castings are dipped in a thin solution of the wrinkle finish, racked to drain off the surplus enamel and to allow the coating to set, and then sprayed while the coating is still wet. The advantages of this dip-spray method are complete coverage, permitting the use of rougher castings and saving considerable quantities of the finishing material.

Wrinkle finishes continue to improve. The wrinkles are now more uniform, capable of being repaired and touched up, and the coatings withstand high humidity for long periods. A wide variety of novelty effects are now available, such as fine wavy lines, wrinkled, with glistening silver effects. Wrinkle finishes may now be applied in white and pastel shades, baking hard under short schedules with almost no discoloration.

An important finish is the flock type, for use as a decorative coating and also to a considerable extent as a protector. This involves the use of a two-compartment spray booth; one for the adhesive or binder, and the next for the application of the flock. All sorts of color effects and tones are obtainable from these soft suede-like finishes, from pastels to vivid colors. Flocking units are also suitable for the application of ground cork, sawdust, dry powders and granules. The important outlets for flock finishes are in the interiors of automobile trunks, cases, articles decorated in novelty effects, airplanes, for use in sound deadening, and parts which the public must handle constantly, to prevent them from feeling cold to the touch.

Air drying metal finishes include lacquers, synthetics in the form of primers, top coats and one-coat finishes in colors and clears for both interior and exterior exposure.

Many have excellent adhesion, are smooth flowing, having lasting flexibility, extensive coverage, a fine high gloss and permanent color retention.

Clear lacquers are available which air-dry in a short time and after a moderate bake, will stand blanking, forming, shearing and drawing, and will resist perspiration, heat, humidity and contact with sulphur and sulphur compounds. Transparent coatings are available for resistance to scratch, which offer a minimum of interference with the color of the basis metal. Emulsions of nitrocellulose lacquers are also in use.

Organic finishes for zinc coats and zinc base die castings which require only a very short bake at higher temperatures are attracting more interest. Short bakes are important here to prevent undue absorption of the copper plate by the die cast alloy.

Organic finishes for aluminum have also been made available. A method has been developed for producing a base coating on aluminum and its alloys for a subsequent

Fig. 9—A bench type, selenium rectifier, capacity 6 volts, 11 amp. Courtesy W. Green Electric Co.

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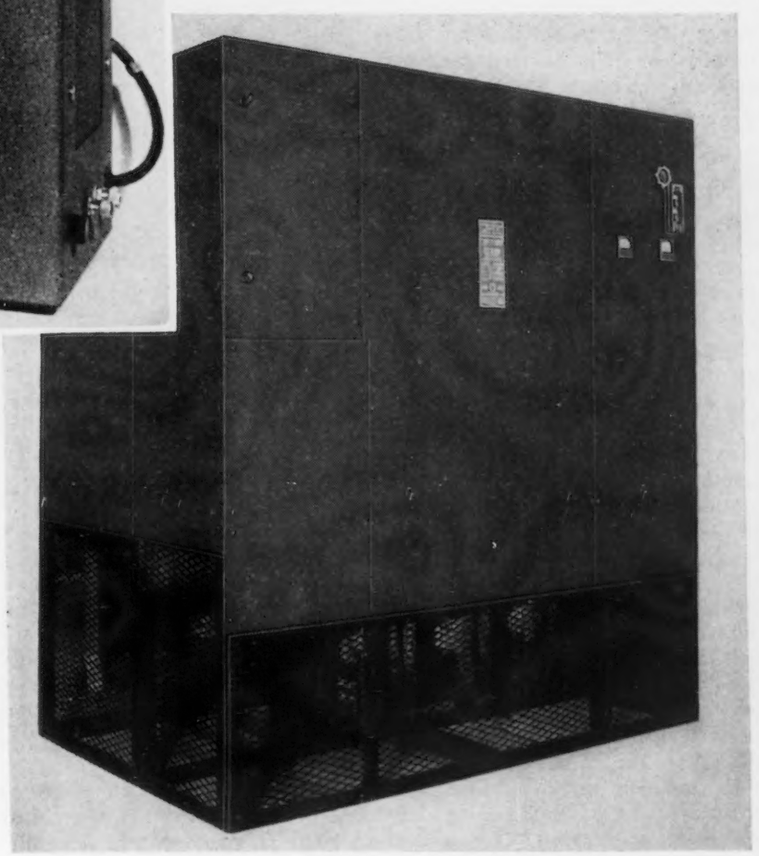
Fig. 10—Copper oxide rectifier, for industrial installation. Courtesy Hanson-Van Winkle-Munning Co.



paint coat which involves only the immersion of the aluminum parts in a heated solution contained in a sealed tank. The aluminum surface is converted into a film of complex basic oxides, said to be highly resistant to corrosion and to form an excellent anchorage for paint, lacquer or enamel finishes.

Several new primers are available for treating magnesium alloys to prepare them for paint or organic finishes.

Color and metal combinations are highly popular metal finishes. The combination of lacquer enamels and polished chromium may be effected by: (1) baking on a special primer; (2) lacquering the part of the product to be colored before chromium plating, with a lacquer that withstands the action of the chromium plating bath; (3) plating chromium on the exposed metal areas.

An important advance in the application of organic finishes is the use of hot lacquer. In this process, lacquer which has been heated up to 150 deg. to 160 deg. F., is sprayed on the product with a specially designed gun. Heating the lacquer reduces its viscosity, permitting the use of materials with a higher solids content and, therefore, the application of thicker films, so that in some cases, one coat of hot lacquer may be used instead of two coats of the cold. Other advantages include a reduction in the finishing time, the production of films that are comparable in build-up with films of synthetic enamels, at the same time retaining the advantages of lacquer, such as rapid drying and hardening, easy sanding and patching and brilliance and quality of color.

An important factor in the application of organic finishes is the recovery of used solvents, which has become common practice among the larger users. The savings so effected are considerable, as the cost of these materials is high, and modern recovery plants using steam condensing units and also activated carbon for adsorption of the solvents, are steadily increasing in number.

Another finish which meets with wide approval is the wood grain finish applied to metal, giving beautiful decorative effects. Finishes like marbleizing, onyx and other special effects can be applied by the air brush.

Organic finishes are still far from their peak of development. There are many synthetic resins under investigation at the present time which may profoundly affect the organic finishing industry. Among the newer synthetics coming into prominence are vinyl acetate, polyvinyl alcohol and the methyl methacrylates.

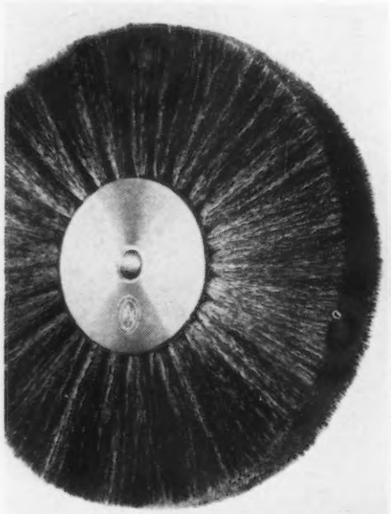


Fig. 11 — "Metl-Hub" brush. Note the one-piece metal hub and the close spacing of tufts. Courtesy Hanson - Van Winkle - Munning Co.

Fig. 12—Painting automobile fenders as they travel on overhead conveyor through a water wash spray booth.

Equipment and Supplies

Some of the outstanding trends in equipment for electroplating include the wider use of organic tank linings and non-corrosive mate-

rials; continuous filtration; external heating and cooling for solutions, as well as immersion heaters; automatic temperature control of heated solutions; pressure spray rinsing, flexible transfer mechanisms for automatic plating machines which will permit varying transfer times independent of main conveyor speed; and higher conveyor speeds with high current densities.

Improvements in generators include the maintenance of constant current density with varying loads and automatic voltage control for the anodic treatment of aluminum. The maintenance of constant current density with varying loads is accomplished by the use of a synchronous driving motor which maintains a constant speed under all load conditions and a flux diversion between the inter-poles and the main poles of the generator.

Copper graphite brushes are now in use which have low contact drops and excellent commutating properties. The graphite acting as a lubricant, polishes the commutator, reducing wear.

One of the outstanding developments in equipment for electroplating is the rectifier in various types (copper oxide, copper sulphide, selenium, magnesium-copper sulphide, etc.), as a source of low-voltage direct current to replace or supplement the present motor-generator sets which seem, at this time at least, to have reached their peak of improvement. The advantages of rectifiers are: light weight; easy installation, requiring no special bases or foundations; absence of moving parts and consequently little or no wear or maintenance costs; instantaneous operation when turned on, eliminating warming up periods; uniform efficiency at low and high loads; flexibility, making possible the installation of small additional units at the point of current consumption. A recent improvement is the use of electrodeposited copper for the copper oxide rectifier, giving a more uniform coating and consequently better current control. (See Figs. 9 and 10.)

Anodic cleaners have been improved to the point where work can be taken directly from the stamping shop, racked, placed in the anodic cleaning solution for from 30 sec. to 3 min., rinsed in cold water and then dried and lacquered, or rinsed, acid-dipped, rinsed and plated.

The washing of metal parts has moved rapidly in the direction of straight line automatic methods. Equipment is now available for a combination of a soak washing, spray washing and rust-proofing or rinsing and drying in large scale bulk operations.

An important advance in production cleaning is the continuous cleaning of strip steel before annealing. This process is electrochemical, the operation being of the continuous straight line type. Steel strip can be cleaned at the rate of 1500 ft. per min. under full automatic control.

Degreasers are now available in small portable units with solvent capacity as little as one gallon. Other designs include degreasing in rotating baskets for cup shaped work to avoid trapping solvent and consequently heavy drag-out.

An elevator type full automatic plating and dipping conveyor has been perfected for a variety of operations including bright dipping, pickling, barrel plating, rinsing, etc. An interesting set up of plating equipment has been suggested by Hogaboom[81] involving the combination of automatic and semi-automatic machines to give greater flexibility with maximum volume production.

Tank linings are swinging steadily toward hard rubber and synthetic rubber-like materials to withstand the action of strongly oxidizing solutions. The tank linings are said to be entirely resis-

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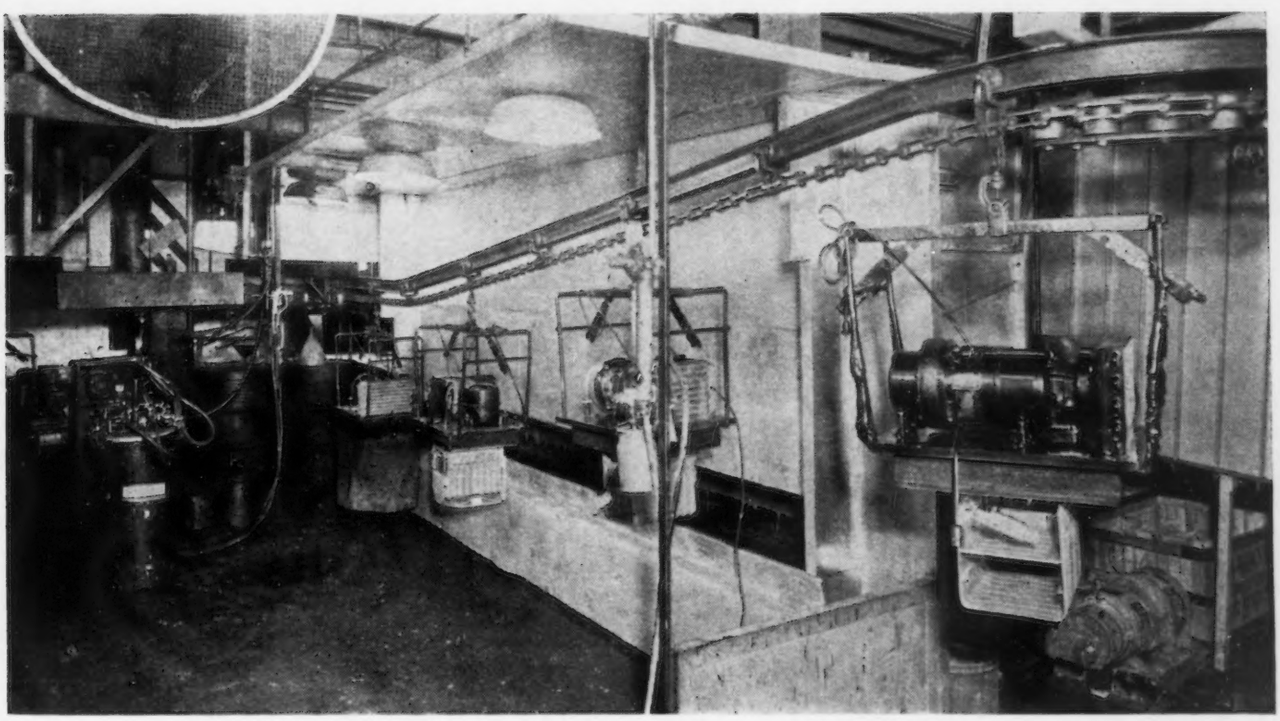
Fig. 13 — Refrigerator units on overhead conveyor as they pass through the enameling spray booth. Courtesy the DeVilbiss Co.



tant to attack by hot oxidizing agents which quickly deteriorate rubber linings.

Plating barrel equipment now includes laminated rubber cylinders with slot openings to allow freer flow of solutions and easier manual cleaning than the perforated type. One new barrel which merits special mention is a "cradle" plater with no perforations but with an open top and a rocking motion, throwing the pieces back and forth from side to side. This type of barrel, it is stated, allows much greater current input and consequently higher speed of plating.

Nickel anodes have been improved. A new anode used in depositing a "semi-bright" soft, malleable nickel contains a small amount of cobalt, and eliminates certain types of pitting without the use of additional agents for this purpose. A new rolled nickel anode containing about 0.25 per cent carbon is useful in low pH solutions, both hot and cold. Cast nickel anodes are now obtainable in the 99 per cent plus grade for use in hot nickel solutions of pH 4.5 or lower and also in bright nickel plating solutions, giving high anode efficiency at high current density and a minimum of loose nickel particles.

Anodes for chromium plating are available in a variety of shapes, two-faced, ribbed, multi-edged, tubular, semi-circular, latticed, etc., for the improvement of current distribution in the solution.

Anode bags for catching sludge and metallic particles have been impregnated on top and bottom with a red resin to prevent disintegration at these points.

An important development in filtering is the increased use of "filter aids" for increasing the speed of filtration and also the use of activated carbon for the purification of bright nickel plating solutions, removing organic addition agents. Another interesting improvement is the use of papers with high wet strengths on the outside of canvas filters, to facilitate rapid cleaning.

Important advances have been made in the development of fast drying rack coatings of low viscosity to withstand plating solutions. These coatings, made of synthetic resins, are available in both liquid and tape form. Such general purpose rack coatings are especially useful on full automatic plating lines where the products are carried on the same racks through successive acid and alkaline baths.

A trend in the direction of small flexible units is evident in plating sets, such as gold and rhodium plating, where the number and size of the parts are often small. One such unit features thermostatic control of the solution. Portable electroplating equipment is now available for plating nickel, copper, brass, silver, etc., from jelly-like mixtures of the solutions.

The polishing room has been under severe scrutiny. Improvements include the use of wheels with special wire mesh centers to accomplish automatic centering and balancing to reduce the pressure required on the wheel. A marked increase is noted in the use of ventilated buffing wheels, which permit cooler operation and consequently higher speeds and faster polishing. Barrel burnishing and even high luster polishing are being practiced more widely. It is now possible to obtain a very good luster and a uniform and scratchless finish on metal stampings. Among other improvements are: the automatic separation of burnishing balls from the work; a combination washing, ball separating and rinsing machine with continuous sawdust drying; new compounds for barrel grinding small steel or non-ferrous parts, giving smooth surfaces and eliminating the pitting often experienced with sand. Burnishing and tumbling are also lending themselves to continuous operation, machines being available in gang type and with automatic electric tilting devices.

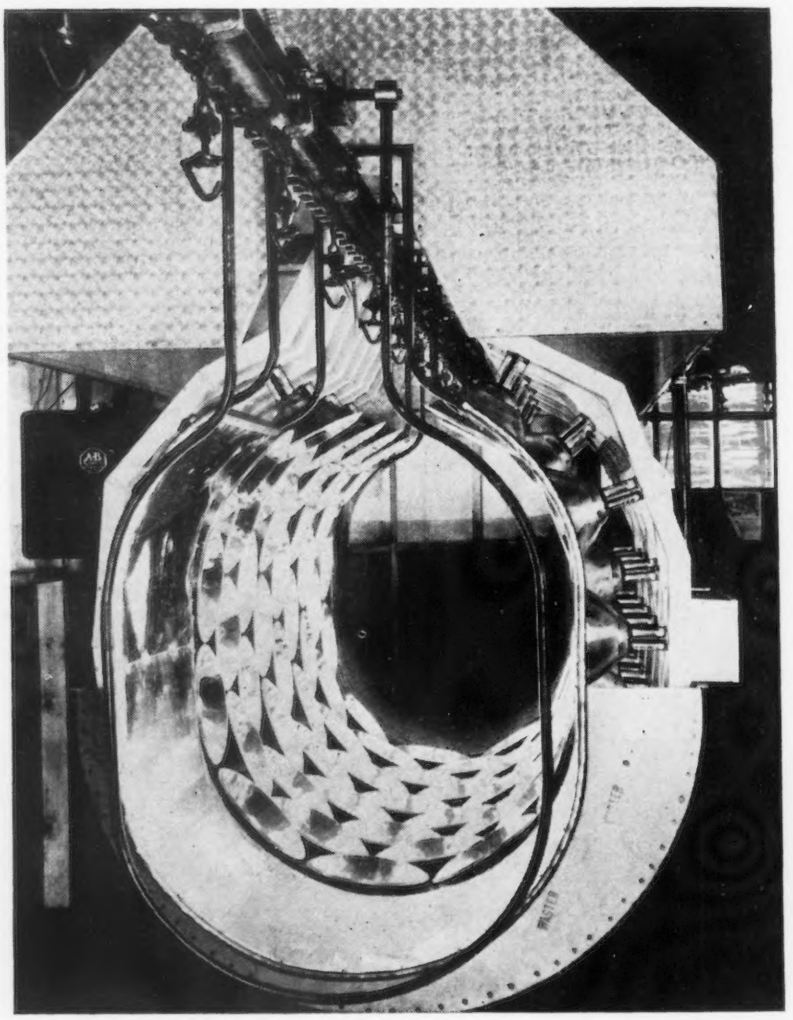


Fig. 14—Open type reflector for infra-red baking. Courtesy C. M. Hall Lamp Co., Detroit.

Small flexible units have been designed, equipped with three speeds, for finishing small batches of work.

Practically any type of work can now be handled by automatic polishing providing the quantities are sufficient to warrant the installation of a special machine for that purpose. A slow speed wheel is available, using a loose abrasive, with the work chucked on a workholder and floated with cushioned pressure. Notable progress has also been made by variable speed lathes.

New abrasives include aluminum oxide and silicon carbide for sharp cutting and long life. Cold liquid cements for set-up polishing wheels have been improved, including a cement for wheels used for polishing aluminum.

A new type of dust collecting equipment uses no cloth screens, no water pumps and no nozzles or jets but is entirely pneumatic. A liquid solution is maintained at a constant level. The dust is removed from the air and retained in the collector in the form of a sludge, which can be removed manually through a clean-out door or automatically, if desired.

Scratch brushes have also been improved, being now obtainable with a metal hub of one piece, light weight alloy, eliminating warping, checking, etc., and improving balance. (See Fig. 11.)

The stringent demands made upon electroplating plants by the close control necessary for operating bright nickel solutions has resulted in sharp increase in the use of control equipment, such as ampere-hour meters for depositing uniform weights of metals; pH papers for testing acid and alkaline electroplating solutions, because of their ease of manipulation under plant conditions. The measurement of the thickness of metallic coatings has been greatly improved by magnetic testing instruments for rapid non-destructive determinations of nickel coatings on magnetic base metals, and nickel coatings on iron or steel.

Equipment for Organic Finishes

Mechanization is today's watchword in finishing room equipment. Mechanization has been applied to the preparation and conditioning of the work surfaces; the application and rapid drying of finished coatings; the handling and transferring of products; the application of decorative effects; and buffing or polishing of the finished coatings. The trend of equipment has been in the direction of automatic operation, production line methods, shorter baking times, remote control ovens, the continued growth of infra-red radiation drying by electric lamps, and the increased use of water-washed booths.

The principle of the water-washed spray booth is the suction of the spray and fumes through a curtain of water into a cleansing chamber where they meet a cascade of water pouring from a pipe and through at the top, thoroughly cleansing the air before it reaches a set of eliminating plates in the top of the booth, and finally a fan in the exhaust stack. Thus no paint accumulates on the walls or in the back of the booth, going instead to a sludge tank from which it can be easily removed and reclaimed. (See Fig. 12.)

The outstanding advantages of the water-wash spray booth are the elimination of loss of solvent and the savings in the labor involved in cleaning the booths. It has been estimated that a standard 10-ft. spray costs about $200 a year to keep clean. The water-wash method prevents the discharge of heavy, solid paint residues to the outside of the booth. It permits the operation of the booth in neighborhoods where the standard fan or blower type booths would be prohibited, and in locations where stacks cannot be installed.

Among the improvements in flocking application is an automatic air coating and painting unit which applies the adhesive and then at the next station, applies the flock by means of a continuous flow nozzle.

Air conditioning is a young but important feature in the finishing room. Clean, fresh air and uniform temperature, humidity and circulation tend to produce cleaner, smoother finishes and reduce spoilage. Paint circulating systems are another important adjunct to the finishing plant.

The continuous conveyor for applying organic finishes permits an unlimited variety of designs. In a typical system, the conveyor passes a loading station, then a dipping or spraying station, the oven, a cooling section and then further finishing or unloading. (See Fig. 13.)

In the finishing of flatware, such as range parts, refrigerator parts, artificial tile, etc., excellent results are obtained by automatic reciprocating spray machines. One example is the device for producing a hammered effect in which one gun applies a bronze or aluminum finish coat, and the second gun immediately stipples the surface with thinner. The double action is obtained by the travel of the ware on a conveyor past the two guns in series.

In infra-red baking which is done by the use of clusters of electric lamps, low in luminous efficiency but radiating a high percentage of infra-red rays, drying has been accomplished sufficiently to permit handling in 3 min., and hard baking in 15 min. This type of drying bids fair to revolutionize the time schedules of organic finishes, reducing baking times to a fraction of their former length. The latest development, sealed lamps, employing 1000 watt heat sources, it is claimed, produces working temperatures at 350 deg. F. in as little as 1 min. (See Fig. 14.)

An important item in finishing room operation is the elimination of the moisture and dust in the air lines to the spray gun. Improvements in spray guns include adjustable nozzles to deliver a spray ranging from a wide fan to a round dot without stopping the gun.

Among the necessary accessories of metal finishing plants is the respirator, which is now made in a variety of types suited to the particular operation, with or without chemical cartridges, to afford maximum protection and minimum resistance to breathing. It can be used against organic and acid fumes and vapors in spray painting, and has in addition an outer dust filter as well as the chemical cartridge.

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Short-Run Parts by

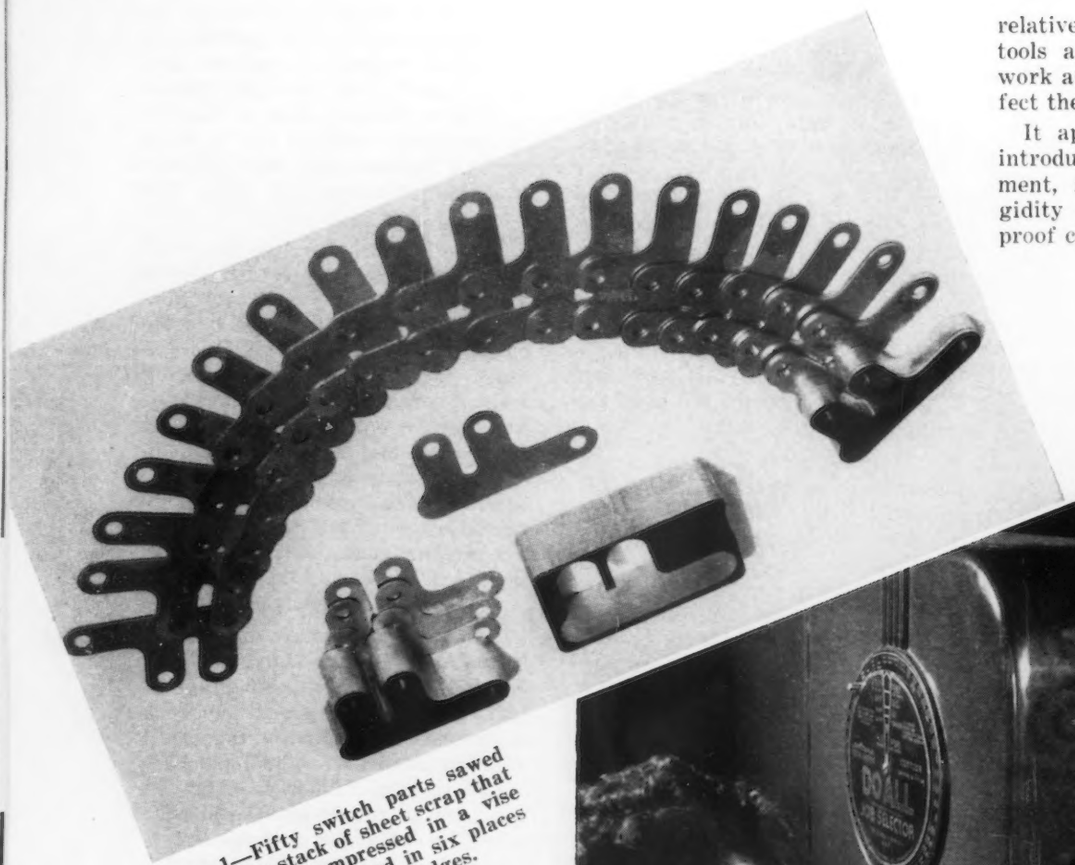

Fig. 1—Fifty switch parts sawed out of a stack of sheet scrap that has been compressed in a vise and sweat soldered in six places along the laminated edges.

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OF all products made in the United States, no more than 20 per cent ever reach or exceed a 10,000 annual production figure. The remaining 80 per cent constitute a quantity production ensemble ranging in steps from a 10,000 high down to a variety of short runs and the making of single parts. Hence the production of parts in limited quantities deserves extensive consideration if the lot is to be machined most economically.

This problem has so many angles that each and every case must be individually analyzed. The course to follow can best be determined by computing original cost of dies, jigs, and fixtures and other tooling and how it affects production cost per piece. Such factors also to be taken into consideration are the relative maintenance costs of the tools and how the nature of the work and other conditions will affect their life.

It appears to me that recently introduced contour sawing equipment, incorporating maximum rigidity and versatility, plus foolproof control and positive precision

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Fig. 2—A 4 in. thick stack of tin plate sheets being notched out in a Doall contour saw for forming into grain pans. The 250 blanks were sawed out in an hour.

Contour Sawing

By H. J. CHAMBERLAND
Production Engineer, Continental Machines, Inc., Minneapolis

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FLAT stampings in small quantities can be duplicated economically by contour sawing of compressed stacks of sheets. The process is also adaptable to three dimensional work such as making repair forgings from square billet stock, and is finding a niche in the preparation of plate components for arc welded jigs and fixtures.

features, can well solve many short run problems, from a single replacement part to a lot of 500 stamping blanks. To the above, we may also include reproductions of forgings and arc welded jig and fixture components. Needless to mention, a contour sawing machine has its limitations and reference is made only to through internal or external cuts and work of a nature conveniently handled in such equipment. The kind of material doesn't matter since the saw will cut or shape approximately 45 different materials.

Sawed Sheet Metal Blanks

In making short run "stampings" without dies, a number of metal sheets are stacked, compressed in a vise or under an arbor press and soldered or welded together at the edges. They may also be bolted together. The layout of the outline of the blank can be done on the top piece by scribing instruments or by template and then the whole stack sawed to shape with a contour band saw. Heavy plate or sheet can be stacked up to a height of 10 in., which is the practical capacity of these narrow precision saws cutting in steel. The contour sawing machine will produce a perpendicular cut with a top-to-bottom accuracy of 0.02 in. on a height of 8 in. The saw leaves a clean slit 1/16 in. wide.

With the contour sawing process, considerable amount of material cost can be saved by utilizing flat stock odds and ends from blanking presses and shearing machines that would otherwise be sold as scrap. Fig. 1 shows how 50 electrical switch parts were contour sawed simultaneously from scrap blanks. To prepare the blanks for sawing, they were compressed and sweat soldered at six points. The stack is 1¾ in. in height and the outline was cut at the rate of 1 in. per min. The stock is 0.035 in. thick.

Fig. 2 shows a 4 in. thick stack of material consisting of approximately 250 sheets of tin plated steel being sawed on the Doall in a single cutting. By clamping the material between top and bottom plates by means of bolts, it was not necessary to drill holes through the sheets. All of the straight sides of the blanks were cut in a squaring shear. This procedure left only four notches to be cut out on the contour saw, including two slots. When the resultant wings are formed into shape, the finished part is a pan suitable for holding grain. The time for cutting these parts was one hour, and Stremel Brothers Co., for which the work was done, estimated that it would take at least 50 hr. to duplicate these blanks by conventional methods without resorting to expensive blanking dies.

Another example of the variety of the work that can be handled in this way is shown in Fig. 3. These gaskets are made from standard gasket paper 0.015 in. thick. Only a few of these were stacked for this particular job, but as many as 100 could have been handled in one cutting. The actual contour sawing time was only 20 min. These particular gaskets are used on the Doall saw itself.

In the short-run production of flat stampings, the major objective of contour sawing is obviously to supersede the press and to eliminate costly blanking dies. At this point it is fitting to mention the Continental method of low cost blanking, which is a patented process licensed by our company. This method consists of making the die, punch and stripper plate out of cold rolled plate, usually case hardened. The die is not attached to the ram but is placed into an opening in the stripper plate having the contour or shape of the part to be blanked. The dies are operated with a shuttle action which brings them in and out of the press for each impression. Cost of such dies seldom exceeds $25, but the labor cost of handling the dies in and out of the press and loading them is about three times that of conventional press feeding by hand. The system is most practical in plants where a product requires an extremely

Fig. 3—A variety of materials may be blanked out with the contour saw. This example shows paper gaskets clamped between sheet steel templates prior to being contour sawed.

large number of different parts but where the individual monthly production of any one part does not exceed 100 or thereabouts. It is limited, however, to stock 3/32 in. or under and it is a question as to whether or not the cost per blank is higher than for those contour sawed, particularly if sufficient pieces are stacked and cut at a time.

Duplicating Forgings

An asset to any manufacturing plant is to be in a position to make or duplicate a replacement part quickly. Frequently a worn or broken part will tie up a machine for days if it has to be ordered from the outside or made by blacksmith methods in the maintenance shop. When it comes to duplicating forgings in a hurry, contour sawing will economically and quickly solve such problems. Blacksmith methods result in a crude looking part and require more or less trimming of the replacement part to make it look as it should. For the contour sawing machine, three dimensional sawing is no "sticker" as shown in Fig. 4. The photograph shows how a locomotive poppet valve lever was sawed out of a machine blank. For this job, forging dies were out of the question and milling, shaping and jig filing appeared to the management to be too long and costly a series of operations. A contour sawing machine shaped the parts in 3 hr. each.

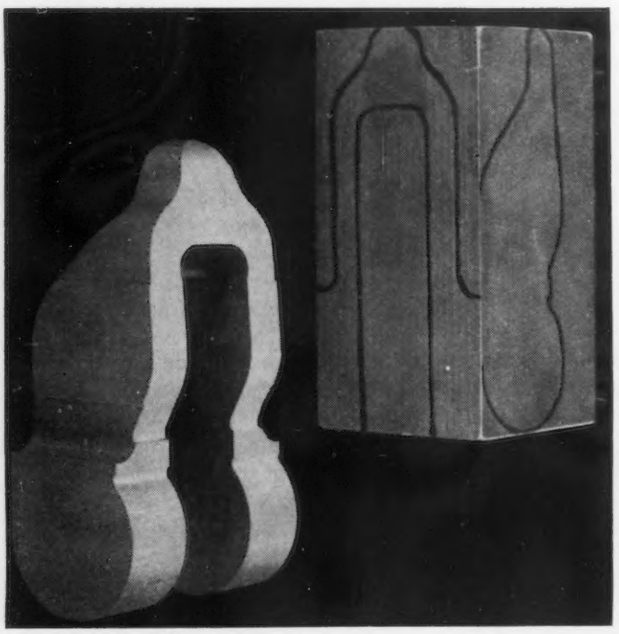

Fig. 4—Forgings can be reproduced by contour sawing by employing double layout. The slot is the first section to be removed. As the outlines are progressively followed, the cut portions serve as resting blocks for the operations carried on from the face at right angles to the former.

Aid to Welded Jigs

There is no denial that cost reduction, weight reduction and integral strength have long been achieved by welded steel construction of machine tool frame and other production machinery. The fact remains that a modern product must not only be made better and more economically but it must look better correspondingly. To judge to what extent welding technique has been improved, we only have to observe some of our present day machine tools fabricated by this process. In many instances, it is almost impossible, except by close observation, to differentiate a welded unit from a casting. There is also a vast contrast in welded jigs and fixtures between those made today and a decade ago. The contour sawing machine has gone far in giving these tools an opportunity to keep up with other forms of manufacturing.

When parts of a jig or fixture are contour sawed, attractive lines are made possible at no extra cost and two or more identical components often can be cut as one, thus effecting an additional saving. Furthermore, unless all components going into a welded jig or fixture are properly cut or shaped, accuracy and rigidity are handicapped before welding of the assembly actually starts. A susbtantial radius or fillet here and there not only improves appearance, but often makes a stronger weld. Since the arc welding technique comprises something like 16 different types of joints, from plain butts to double-V Ts, and all involve more or less angular or contour shaping, this is sufficient reason to give the contour saw primary consideration in the preparation of the parts. This choice will materially help to prevent many causes of defective arc welding. By using steel plate of varying thickness, many jig and fixture parts can be entirely machined in the contour saw because it is well adapted to produce round as well as irregularly shaped holes.

Fig. 5—Contour sawing of the component parts of this fixture from plate stock, modern arc welding technique and a sand blasting operation for the finishing touch give this tool an appearance far different from the crude looking welded jigs and fixtures of a decade ago.

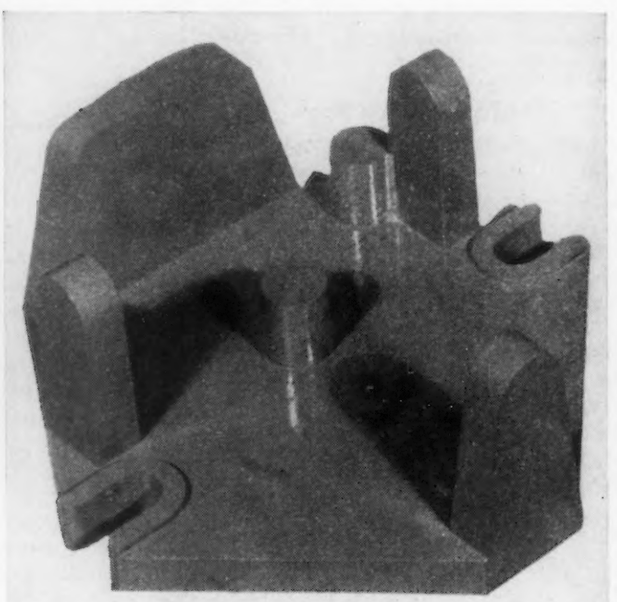

Fig. 5 shows what contour sawing has done to improve the appearance of a welded steel fixture. It wouldn't look any better if it were cut from a solid block. This appearance results from modern arc welding technique, contour sawing of components and a sand blasting operation to impart a finishing touch.

Addition of the center bearing on the spindle of Milwaukee Milling Machines reduces by one-half the distance between bearings and thus increases rigidity 8 times—(shaft deflection varies as the cube of the distance between bearings.)

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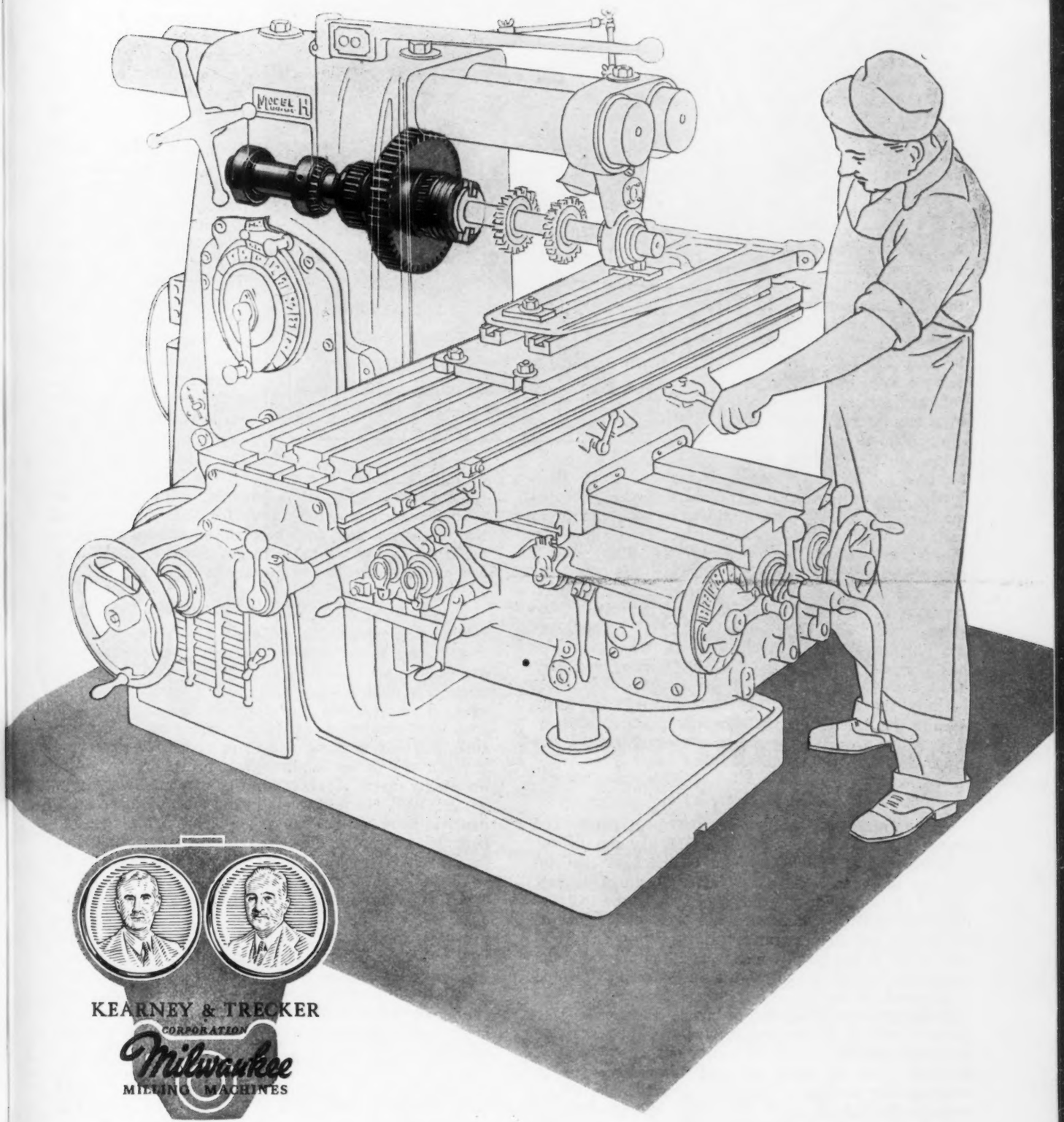

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MILWAUKEE MILLING MACHINES

On The Assembly Line

BY W. F. SHERMAN
Detroit Editor

• Conversion of automobile plant from cars to ordnance illustrated by Olds forge works at Lansing, where 2,030,000 shells are to be made . . . Defense work causes strain on transportation, parking space, etc., in Detroit area . . . Motor car output climbs again.

DETROIT—In view of many generalizations that have been made about converting the automobile industry willy-nilly into a national arsenal, it might be well to examine a type of plant where conversion from automotive to ordnance equipment is being accomplished.

Within the past month the General Motors forge plant of Olds Motor Works in Lansing has turned out a small pilot run of 75 mm. shells to serve as samples for the machining operations that must be performed on the 2,030,000 shells of this caliber that GM has contracted to deliver to the government from this plant by Jan. 31, 1942. This sample run was to be followed almost at once by a similar run on 105 mm. shells of which the forge plant will deliver 800,000 to the government within the next year.

Olds men point out that there are several accepted methods of making shells—notably the hydraulic press method, in which the shell is extruded from the stock, the pierce and draw method, the so-called "Witter process" and the upset method, in which piercing tools are employed in a series of six operations to fashion shells by the internal displacement of metal from bar steel. (See "Shell Forging by the Upset Method," p. 25, THE IRON AGE, Jan. 16.) Each of these methods has its advantages, but the General Motors forge plant has adopted the last-named, principally because it permits the conversion of the equipment regularly used in the production of Oldsmobile parts. Moreover, it provides a very close control both of quality and dimensions of the product.

All the Machinery Is New

All the machinery installed in the forge plant (and there was considerable because GM planned to use forging presses extensively and do much of the machining of parts immediately after forging) is new and of up-to-date design. Most of that in the tool and die shop was purchased with the original purpose of producing automobile crankshafts and other Oldsmobile parts. It has now been converted to die production for shells and almost all of the facilities are devoted to government work.

It is apparent that the ordnance work is closely enough related to the automotive work so that no wholesale transformation of equipment was necessary. However, the old staff required several months to complete the tooling of the plant to the stage where some sample shells could be made. Manufacture of shells on a production basis cannot be started until April 1, when it is hoped to have a complete setup of machinery necessary to turn out 200,000 of the 75's and 80,000 of the 105's monthly. Today there are fewer than 100 men working in the new forge plant, exclusive of a corps of tool designers and plant layout men; by May 1, it is expected, this number will be 500, increasing gradually as equipment is received, by the end of 1941, to 1000 men.

On a relatively small scale, perhaps, this is what is going on in scores of plants which are undertaking defense work allied with their peacetime production. The problem is greatly accentuated in the cases where automobile plants are tooling up for airplane parts, engines, machine guns, etc., that differ radically in many respects from normal products. Incidentally, the Olds order represents only a small percentage of the intended production of 100,000,000 shells on order with some 35 or 40 independent manufacturers for 1941 delivery, and this does not take into account ammunition components being manufactured in government arsenals, or any commitments made directly to the British.

This War Adds to Vocabulary

Gaining popularity in the argot of defense conversation is the term "bits and pieces," which everyone knows by now is associated with the British shadow plant or system of sub-contracting; among other Anglicized expressions and terms creeping in is the somewhat confusing "air-frame" which covers a structural part of aircraft not more specifically referred to, such as engines, landing gear, propellers, etc. Also seemingly used to refer to the airplane body sans wings. Well, the last war added a lot of French aeronautical terms to our language such as fuselage, empennage, aileron. . . . Interesting to the auto industry in Detroit, in view of recent engineering sessions devoted to synthetic rubber, is announcement that Federal Loan Administrator and Secretary of Commerce Jesse H. Jones has asked the rubber industry for proposals for construction of plants to make synthetic rubber for the defense program. Engineers here were warned in December that there might be a shortage of synthetic rubber for gaskets, seals, oil-resistant tubing and other specialized applications. . . . Improvement in engine design might help reduce the number of types of lubricating oil now used in motors, R. J. S. Pigott of Gulf Research & Development Co., told the SAE recently. He cited advantages to the Army and Navy if only a few types of oil had to be stocked to care for all motors. . . .

Housing facilities, plant parking space for em-

ACCURACY . . .

These ground gears, by now, are assembled in Pratt & Whitney Model "C" lathe headstocks. Such finished precision lathes are transmitting their fine accuracy into the production tooling so essential to our defense program.

formula for production

THE formula for production is no secret. Every tool engineer knows it—knows that given basic accuracy in jigs, fixtures, and gages, virtually unlimited production can roll off assembly lines in record-breaking time.

At West Hartford, twenty-four hours a day, over 3,200 Pratt & Whitney craftsmen are producing essential accuracy in machines that make machines—machines that in the hands of engineers and tool-makers quickly provide the formula for production. Result—more output, less waste, and specialization of work that will create new defense jobs by the thousand.

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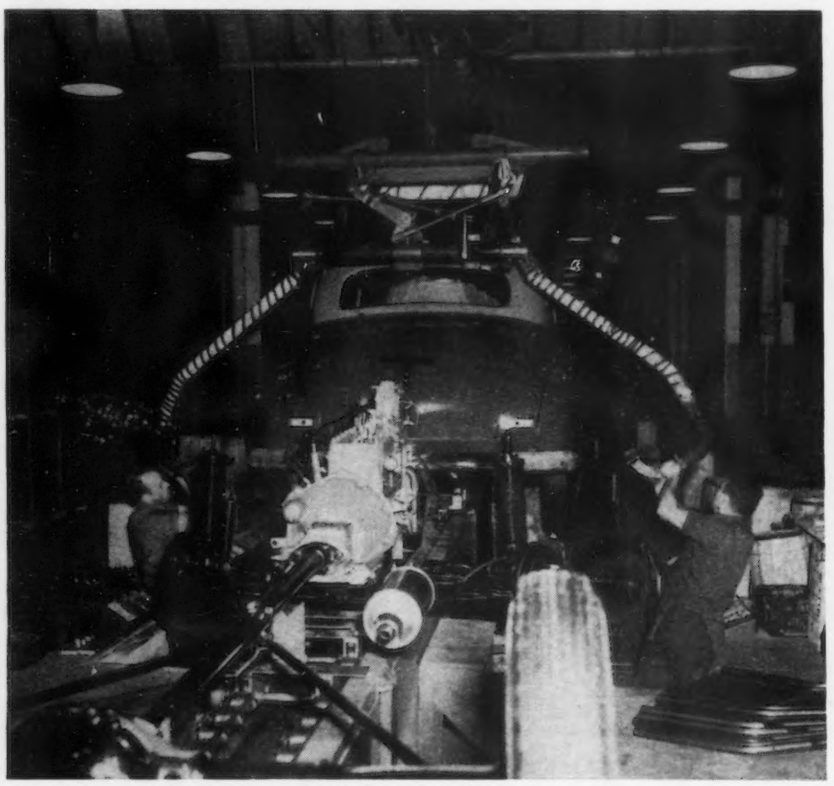
ployees' cars, roads, transportation —all are causing worry in Detroit now. Also, the problem of obtaining skilled and semi-skilled men to do the work in defense shops which are being tooled up. . . . A steel industry spokesman here last week revealed similar fears for mills doing defense work all over the country. . . . An acute housing shortage in areas near Army concentrations and near industries producing war orders may compel establishment of a State housing and zone control agency, it is reported in a survey by the Michigan Defense Council. . . . City zoning laws impose some unreasonable restrictions on defense industry, according to a protest made by a Detroit tool manufacturing shop which petitioned for exemption under Detroit's new zoning ordinance. The ordinance prevents this manufacturer from expanding his plant which is in an area just recently classified as non-manufacturing.



A new kind of assembly line at the Nash plant where the "600" model is produced. These cars have frame integral with the body, and the "chassis" consists principally of the power plant, transmission, drive shaft, torque tubes, and axle. Final assembly workers stand in a pit under the assembly line and the running gear of the car is assembled to the body from below.

Auburn Central Mfg. Corp., Connersville, Ind., which manufactures sheet metal products, will be expanded and will establish an aircraft parts division for sub-contracting work. Harry Woodhead, president of Aviation Mfg. Corp., and chairman of the board of Vultee Aircraft, Inc., which have units in Detroit, has been elected president of Auburn Central, succeeding John K. MacGowan, who will continue as a director. Eric O. Johnson, Auburn vice president and general manager, will have charge of the Connersville plant. . . . Imitating the new Pennsylvania Turnpike, Michigan will seek legislation to permit construction of limited access highways. The highway commissioner says it will help relieve pressure of traffic generated by national defense production. . . .

Following a trend recently established in the electric refrigerator industry, Frigidaire division of General Motors Corp. is lowering prices $5 to $10 per unit on some models for 1941. . . . Radio controlled robot target planes, a full squadron of them, are being put into use at Selfridge Field near Detroit, it has been disclosed. Robot member of the team used for this sort of work is an obsolete PT-2, a two-seat biplane training craft equipped with radio receiver and an intricate system of radio-coupled controls. The control is an O-38 observation plane equipped with radio transmitter and a device for dialing the controls which remotely operate the target planes. . . . The use of "live" objectives has also been reported in the Navy dive bombing program. Boats made by the Robinson Marine Construction Co. of Benton Harbor, Mich., built of metal with steel decks and steel turrets, are used as targets for non-penetrating bombs, it has been reported.

Automobile production has finally regained the level which it was hitting each week before the Christmas holiday. Output is being rushed to keep pace with what appear to be continued contra-season sales levels, probably occasioned by rumors, as yet unsubstantiated, that prices will be increased sometime before spring. Assemblies in the past week totaled 124,025 compared with 115,935 in the previous week and 108,545 in the corresponding week of last year, according to Ward's Automotive Reports.

↓ ↓

• • • **Location of the** United States Navy's new ordnance plant, which will be operated by Hudson Motor Car Co., will be at Nine Mile and Mound Roads in Warren Township, Macomb County, just north of Detroit, it has been announced.

Contracts for the plant will provide for structure and equipment worth $13,000,000 for manufacture of parts for guns and torpedoes. The arsenal will employ about 4000 workers. It is expected to remain in operation at least until 1944. It will cover 114 acres and include 400,000 sq. ft. of machine shop and assembly space in addition to office and storage buildings. Construction will be started immediately.

Hudson has been making preliminary plans for tooling and procurement of machinery and tools is expected to start.

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BY L. W. MOFFETT
Washington Editor

• TNEC secretary's report claims "various forms" of rivalry rather than true competition prevail among steel companies . . . Material to be given to Congress . . . Defense program now overshadows the committee's work.

WASHINGTON — Dewey Anderson, executive secretary of the Temporary National Economic Committee, observed in a progress report submitted to the committee last week that lack of variation in steel prices is due to the integration in the industry, with "various forms of rivalry rather than true competition prevailing among the several companies."

Appearing before members of the TNEC as they met for the purpose of laying plans for writing a final report to Congress, Mr. Anderson said that while demand, production, employment, payrolls and earnings in the steel industry show "enormous variations, steel prices do not." Attributing this to integration and "various forms of rivalry," he referred briefly to the TNEC hearings on iron and steel. He called them the most extensive conducted by the committee.

With its hearing completed, its authority to issue subpoenas expired, its tenure fixed for April 3, when a final report is due to be made to Congress, the committee convened under circumstances strongly indicative that it had seen "better days." Its work largely overshadowed by the defense program, with at least one of its functions—watching prices—terminated several months ago, the full membership blossomed forth for one day and faded into virtual retirement the next.

United States Steel Corp., Mr. Anderson reported to the committee, accepted its obligation to testify so seriously that it developed an elaborate research study which it published in three volumes. He recalled that corporation engineers and economists were engaged in this research for months before the hearings, "assembling a body of data which adds much to our knowledge of this basic industry."

Summary of the TNEC Report

The hearings, covering the iron ore industry, steel price policy and price behavior, and the position of exports, were summarized this way by the TNEC executive secretary:

"The hearing went into the matter of price in detail, discussing the basing point system, price changes and deviations, 'extras,' the relationships of transportation to steel prices, delivered prices, 'phantom' freight, fabrication in transit, and identical bids. Numerous suggestions have been made to bring about price competition in the steel industry, among them the pricing of steel 'at the mill' rather than 'delivered' and the allocation of government contracts according to the capacity of various bidders to produce the product.

"Representatives of the steel industry advanced other methods of meeting the issues raised in the hearings, such as reduction in costs, principally of labor, liberalization of government policies of taxation and labor relations to permit a larger flow of investment in order to increase capacity, and steel prices fixed for given periods of time by consultation."

Committee members were told by Mr. Anderson that the 10 largest companies in the steel industry own 88 per cent of the funds invested; that the five leading companies produce over 50 per cent of the total output of each steel product; and that two leading companies possess 55 per cent of the total assets invested in the industry.

Mr. Anderson emphasized the importance of the industry to the national economy, pointing out that it ranks first in value of all manufactured products, in value added by manufacture, and in number of wage earners employed. Located largely in three centers, Pittsburgh, Chicago and Birmingham, producing a heavy and bulky product, transportation and freight costs become a major problem to the industry, the progress report said.

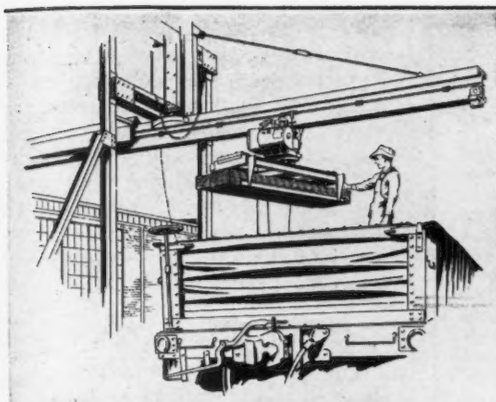
"The demand for steel products," Mr. Anderson declared, "fluctuates widely with changing factors in the business cycle, making the industry alternate between 'prince and pauper.' "

In the report's reference to concentrated control over natural resources, the TNEC's executive secretary asserted that one company owns approximately half of all the Lake Superior iron ore, that other steel companies own another one-third, with the remaining one-sixth owned by other than steel producers. He reported that "even this one-sixth is dominated to a large extent through interlocking directorships with major steel companies."

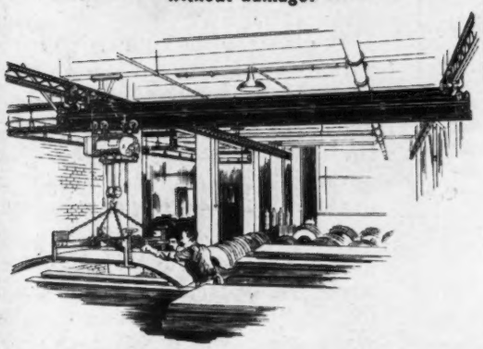
Ore Prices Cited

Commenting curtly that "concentration of control" has "assuredly not been an obstacle in the way of maintaining iron ore prices," Mr. Anderson drew upon TNEC testimony in advising committee members that the iron ore base price has changed only twice in the past 15 years, and on both occasions the change represented an increase.

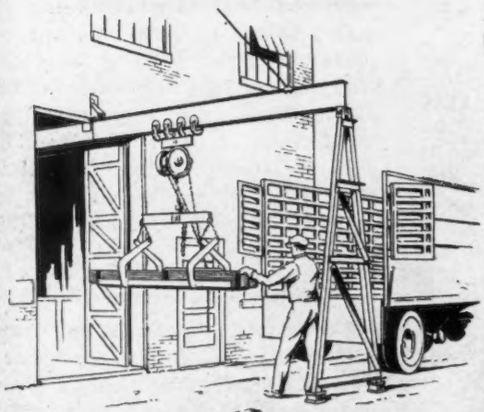
"There have been many proposals for mitigating the effects of concentration of economic power over iron ore resources," Mr. Anderson explained. "Occasionally proposals are made for the divorce of ore and transportation companies from steel companies.



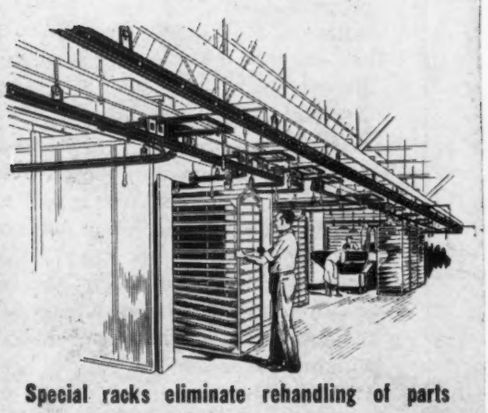
3-ton bundles of steel sheets unloaded quickly without damage.



Crane interlocks with spur tracks for safe movement of stock.



Retractible crane reduces cost of unloading steel from trucks.



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but all such notions of 'disintegrating the integrated' fail to consider adequately that cartels or combinations at each of several stages of production may produce even more deleterious effects."

Technology Surveyed

Technology, on which Washington bureaucrats and members of Congress alike have placed much of the blame for unemployment, was also surveyed by the TNEC, and in this connection steel, automobiles, railroads and other groups were examined. In his report Mr. Anderson used an excerpt from testimony given the committee by Philip Murray, then SWOC chairman, who insisted that the American economy has not kept pace with the advance in technology during the past decade; that industry was not expanding to absorb the workers displaced by technology.

The TNEC spokesman expressed no opinion of his own on the subject, but forecast that material given his committee, much of which is claimed to represent data never before available, will have "a far-reaching effect on the thinking of leaders in management, labor and government." His report contained no recommendations, and Mr. Anderson emphasized to committee members that "conclusions to be drawn from the facts presented are left with you."

These conclusions, together with any recommendations, are to be embodied in a report which the committee will prepare in the weeks ahead and submit to Congress. In view of the activities surrounding the defense program, it is doubtful that the committee will urge any steps likely to be disturbing to business or that would inject drastic changes in long-established business practices and policies.

Defense Plants Found 30 to 40% Unionized

• • • Since workers in defense industries are only "30 to 40 per cent unionized, with aggressive organizing campaigns under way or projected in most fields . . . many disputes are likely to get out of hand and result in strikes, unless some agency outside the industry intervenes to facilitate a settlement." Compulsory arbitration, however, has been found to be "unworkable" in a democracy, whereas the proportion of success in cases of voluntary mediation "usually runs above 90 per cent."

These findings are included in an emergency survey of labor policy under the defense program now being made by The Twentieth Century Fund. Advance portions of the report were made public by Evans Clark, executive director of the Fund.

Defense Changes Picture

The defense situation has changed the picture in a few short months. Business is at least outside the doghouse. Some of its representatives are now occupying high places in the council tables of the Administration. Whereas some government spokesmen not so long ago were calling for a change in the upward trend in technological advances, today they are clamoring for more, and even complain that "more" is not enough.

The Federal Trade Commission, whose spokesmen spiritedly called for abolition of the basing point system in favor of an f.o.b. mill pricing system made little headway in impressing the committee with the FTC's thread-worn panacea. Because of the manner of presentation, the FTC basing point study was largely discredited. Even Justice Department representatives working on the TNEC steel study were known to have been considerably irked by the persistency of anti-basing point advocates in the FTC.

O'Mahoney's Licensing Bill

The extent to which the committee will go in discussing Chairman Joseph E. O'Mahoney's Federal licensing measure is a moot question. The senator has frequently disavowed any intention to promote his bill by using the committee's machinery, but on the other hand he has demonstrated no disposition to abandon his personal espousal of the measure.

In his opening statement when the TNEC convened in open session last week, the senator made no mention of his bill, but warned that the existing economy in this country must make itself capable of providing stable employment for the population or "big government" will take over control.

He added that such a condition would be forced on the country

THE BULL OF THE WOODS — BY J. R. WILLIAMS

WOULD YOU MIND EXPLAINING THAT TO US WOMEN?
WELL, THAT'S A MAIN HOIST DRUM FOR AN ELECTRIC CRANE, AND THAT'S A CABLE GROOVE I'M CUTTIN' IN IT NOW--ONE GROOVE IS RIGHT-HANDED AND TH' OTHER LEFT, AND--
TH' BOSS LOOKS KINDA SORE BECAUSE SHE DIDN'T ASK HIM-- I'D THINK HE'D BE GLAD TO GET OUT OF EXPLAININ' TO PEOPLE WHO DON'T KNOW WHAT YOU'RE TALKIN' ABOUT
I'D BE SORE, TOO-- THAT'S HIS WIFE AND HE MUST AMOUNT TO SO LITTLE AROUND TH' HOME THAT SHE CAN'T BELIEVE HE AMOUNTS TO ANYTHING HERE EITHER
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THE DUNCE CAP
J.R.WILLIAMS 12-16

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through circumstances beyond its control and not because there is any desire on the part of legislators to see established any form of "big government."

The senator, who indicated that any discomforture suffered by witnesses before the committee was "purely incidental" to the main purposes of the study, told the committee that whether the TNEC studies will lead to a solution of economic problems remains to be seen.

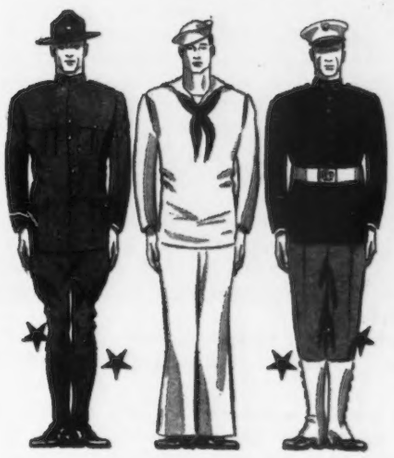
"Perhaps it would be presumptuous of us to assume that we can make an answer," he added. "But it cannot be doubted that we have assembled a wealth of material which, if it is properly coordinated and distributed, will prove of assistance to those who eventually must answer these questions if the freedoms in which as Americans we traditionally believe are to be preserved."

If the senator's use of the phrase, "if it is properly coordinated and distributed," is construed to mean that the committee is angling for a new lease on life, he did not disclose any such intentions in other parts of his prepared statement. He did, however, spend some time in outlining the relationship between problems studied by the committee and "the conflict that threatens to engulf the world." He spoke in highly complimentary terms of valuable work of those associated with TNEC, thanked the members of the committee staff, and praised "the objective manner" in which the studies were pursued.

The apparent attempt to link the committee's findings with the problems to be faced as a result of the defense program may be without significance. Nevertheless, if members of the TNEC stand idly by and accept their demise gracefully without a concerted attempt to perpetuate in some form the work of the committee, they will run counter to the precedent established by other instrumentalities of the Federal bureaucracy.

While the TNEC as such may not be resurrected, its work has whetted the appetites of at least three Federal agencies. The aspirations of the Federal Trade Commission, the Department of Commerce and the Department of Justice bear close watching in this respect.

Prepare For INSPECTION



The Sheffield Electrigage has eliminated the bottleneck of slow, tedious dimension checking in many inspection departments because it flashes its answer instantly—just as fast as the work pieces are presented. If the signal light flashes amber the part being gaged is within specified tolerances. Green shows oversize, red undersize.

The accuracy of this gage is .000010" at any tolerance. It can be set for tolerances from .012" to .000050".

The Electrigage is flexible, consisting of a gaging head, light unit and base. The three elements may be used in one assembly for inspection department work or for checking purchased parts on arrival. The gaging head may be mounted on a machine to check parts in the process of manufacture while still on the machine. In such use the light unit may be assembled with the gaging head or with other light units at some location which would permit the control of several machines by one man.

Write for information about the wide use of the Sheffield Electrigage.

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Fatigue Cracks

BY A.H.DIX

He Craves To Be Informed

• • • We envy those individuals who refuse to be bound by the dictionary's narrow limits, and who, when confronted by a situation that demands a certain term and none is handy, promptly assemble a mess of syllables, and a new candidate for the dictionary is born. These etymological Edisons are responsible for such inventions as *flibbertigibbet, flim flam, jalopy, jive*—we could mention dozens if we could think of them.

Of course, without such geniuses there would be no language. Centuries and centuries ago, even before your favorite journal first saw the light of day, an Anglo-Saxon got bored with making chairs, and just for the hell of it made something to sit on that was longer than a chair. Not knowing what to call it he invited a couple of friends in, and after a couple of rounds of mead, asked for suggestions. After a while one of them said, "Let's see now. How about *benk, binch, dench*—I have it—*bench!*" And that's how benches were born.

The art of word-coining is by no means dead. A current instance of it is in this letter just written us by a gentleman in Ottawa, Kan.:

> "I am developing a machine to compress old auto bodies. What is the largest size bail that can be generally used in the industry. Am concerned in informating apperanging such a machine."

Plow Brake

• • • Ears alert for unusual words adorn the head of your Detroit observer, Bill ("On the Assembly Line," see page 52) Sherman, who tells us that a word frequently heard around Detroit these days is *sprag*. A sprag is the arrow-like steel piece suspended from the rear axle of anti-aircraft gun carriages and other heavy vehicles, to prevent backward slippage on steep grades.

It has a grating, grinding flavor and sounds like just what it is. Little sprags would be useful for walking uphill on skis.

Morbidly Monickered Mortician

• • • *Rudy Anderson, of the National Automobile Dealers Assn., completes the happily named undertaker cycle by telling us that Detroit has one named John E. DeKay.*

Steel Mining

• • • If you have to make detours soon because streets that used to have trolley lines are being torn up, you can blame C. H. Kissel, of Goulds Pumps, Inc. He wrote us:

"I have been thinking about something for the past month or so and that is the tremendous tonnage of steel rail scrap which is buried beneath the macadam in most of our cities and villages of the country. If there is any money left in the WPA, why would it not be a good idea to foster a lot of projects throughout the country of taking up these rails and repaving? Price of steel rail scrap is nearly up to a point where it would pay to have this done.

"If this suggestion has any merit, I think THE IRON AGE *would be a good one to broach the subject to Mr. Leon Henderson at Washington."*

We relayed it to Leon Wesley Moffett, who goes around Washington for you like a cooper goes around a barrel. "Moff" immediately telephoned Leon Henderson of the National Defense Advisory Commission, and the suggestion is now under consideration.

One Thumb Down

• • • Votes on the Annual Number are now in from practically all countries. With the exception of one Bronx cheer, all were hosannas. Samples:

"A grand job."
"Best Annual Number we have seen."
"Remarkable piece of work."
"Most beautiful and best yet."
"Most valuable and concise. Will be of great assistance."
"Absolutely magnificent."

The Bronx cheer read:

"I shall be glad when advertisers in mechanical magazines omit women and children from their ads. Please excuse me for being such a b—— crank."

To see how badly this combination misogynist and misopedist was wounded, we went over every one of the 610 ads in the book, and find they contain a total of one child and seven women, two of which are old and should therefore be disqualified. But even if you count them in, this is only .0131 women and children per ad, and we defy any journal to show a lower ratio, always excluding, of course, the *Journal of Sedimentary Petrology.*

Canaries, Corsets And Crows

• • • We have before us a list of American periodicals, and we fling the defi especially at the *Accordion World; American Pidgeon Journal; American Fern Journal; American Rabbit Journal; American Shade and Awning News; Barrel and Box and Packages; Bean Bag; Bird Banding; Brooms, Brushes and Mops; Cackle and Crow; China, Glass and Lamps; Corset and Underwear Review; Explosive Engineer; Feathered Warrior; Frontier Bees and Honey; Hog Breeder; Journal of Allergy; Macaroni Journal; Orchid Digest; Pipe Line News; Potato World; Skeet Shooting News; Spice Mill; Goat World; Turkey World,* and *American Canary Journal.*

Stopper Correction

• • • The eye-stopping headline *"How to Take a Plane in the Air Without Leaving the Ground"* was credited to Goodrich in error. The glory belongs to Allis-Chalmers.

Heart Throbs Dept.

• • • L. S. Simons writes that our copy of D. H. Lawrence's "Lady Chatterly's Lover" must be expurgated, as his was plural. We guess we just got our 39¢ worth. And R. W. Weesner writes:

> Although you may have stumbled through **"Revolt in the Desert,"** it's certain that you tripped over **"Pillars of Wisdom"** —especially the title. It's **"Seven Pillars of Wisdom."** Being somewhat of a Lawrence fan, I feel that he should be given his due, at least his due amount of pillars."

They Added Ten Years To Our Life

• • • *Industrial Marketing* has figure trouble, too. In its January issue it reports that we are 96 years old. Subtracting 1855 from 1941 leaves 86, so we will have to wait 14 years instead of 4 before we can begin working on our centennial edition. We can already see in it a chart showing how nice it was back in the good old days of '41 when the national debt was 'way down to 46 billions.

Puzzles

Our puzzle book says that if it takes a clock 7 seconds to strike 7 it will take 10½ seconds to strike 10, but it doesn't say why.

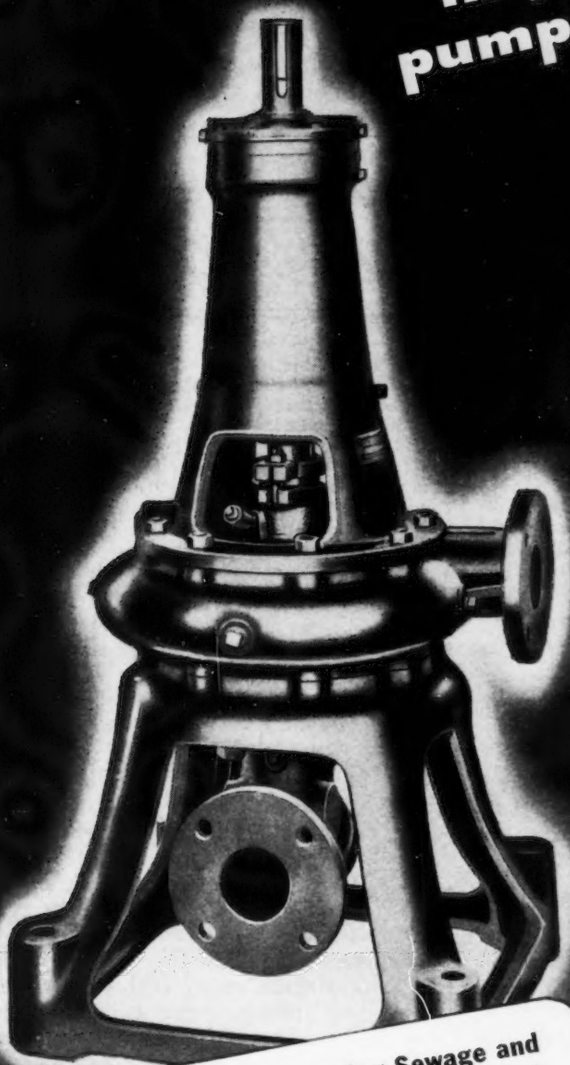
A. E. (Superior Die Casting Co., Cleveland) Weiss makes the area of the Jan. 9 large, round farm as 33,387,700 sq. ft. and the little farms each 5,728,500 sq. ft.

Eight minutes is par for this one sent in by Charles S. (Hoskins Mfg. Co.) Kinnison:

> *A farmer sells 15 calves, 14 lambs and 13 pigs and received $200. Later, at the same price, he sells 7 calves, 11 lambs and 16 pigs, for which he gets $141. What is the price of each?*

A THIEF

in your pump pit?



Fairbanks-Morse Non-clog Sewage and Trash Pumps—A complete line of vertical-shaft (pictured) and horizontal-shaft pumps for handling fluids containing large solids and much foreign matter, such as unscreened sewage, storm water, tannery waste, sardines, bagasse, food solids, and pulp.

IF your pumps are as much as 10 years old, there *is* a thief in your pump pit, committing larceny through your power meter. Why? Because even though still as good as new (which is unlikely), 10-year-old and older pumps cost at least 10% more to operate than today's improved Fairbanks-Morse Pumps. And if your pumps have declined in efficiency through years of use, they are stealing *considerably more than 10%* in excess power consumption.

Such inroads on your profits are too great to tolerate. Find out now how much you could save. Whatever your pumping requirements may be, they can be met to your profit and satisfaction if projected against the vast pump engineering knowledge and experience of Fairbanks-Morse, manufacturers of the most complete family of modern, general-purpose pumping equipment.

Write to Fairbanks, Morse & Co., Dept. 47, 600 S. Michigan Avenue, Chicago, Illinois. Branches and service stations throughout the United States and Canada.

7884-PA40.73

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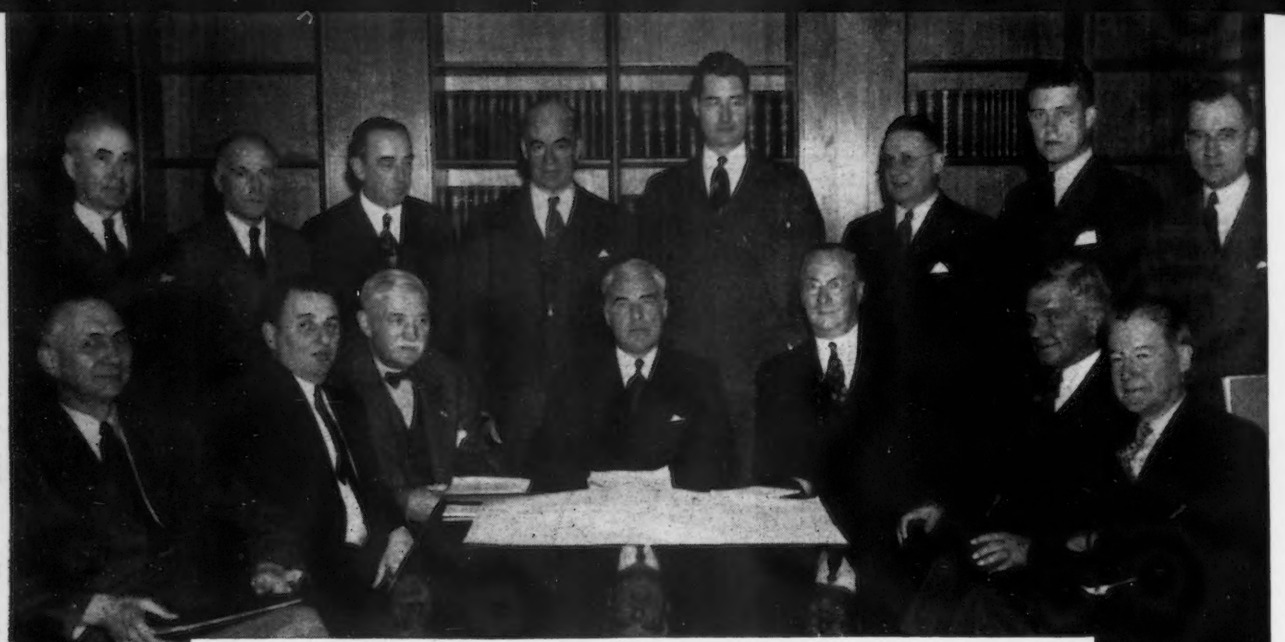
DIESEL ENGINES ELECTRICAL MACHINERY RAILROAD EQUIPMENT WASHERS-IRONERS STOKERS
MOTORS FAIRBANKS SCALES WATER SYSTEMS FARM EQUIPMENT AIR CONDITIONERS



News of Industry

The New Priorities Board, established by Executive Order creating the Office of Production Management, held its first meeting Jan. 14 for the purpose of organizing and establishing procedural routine. Picture shows the board and its appointees (left to right) Seated—Capt. A. B. Anderson, representing the Secretary of Navy; Leon Henderson, member of the National Defense Advisory Commission, in charge of Price Stabilization; William S. Knudsen, director general of the Office of Production Management; Edward R. Stettinius, Jr., chairman of the board and director of the Division of Priorities of the Office of Production Management; Donald M. Nelson, director of the Division of Purchases of the Office of Production Management; General R. C. Moore, representing the Secretary of War, and John D. Biggers, director of the Division of Production of the Office of Production Management. Standing—Brig. Gen. Harry K. Rutherford; James F. Towers, assistant directors in charge of administration; Charles E. Adams, who will organize the activities of the various industry committees which will be appointed from time to time; Dr. Ernest M. Hopkins, who will serve as chairman of the committees to be appointed under the Minerals and Metals Section; Blackwell Smith, assistant director in charge of staff activities; R. J. Lynch; A. C. C. Hill, Jr., Deputy Director, and Marion B. Folsom.

New 4-Man Steel Priorities Board Recalls Developments in 1917 War

By C. E. WRIGHT

• • • **Appointment of** a four-man iron and steel priorities committee to serve under the director of priorities, E. R. Stettinius, Jr., in the newly organized Office of Production Management recalls the various steps that were taken in the development of a priorities system in 1917 and 1918 during the first World War.

The most complete record of the growth of the priority system in the other war is to be found in the book, "American Industry in the War—a Report of the War Industries Board," written by Bernard M. Baruch, chairman of that board. (Government Printing Office, 1921).

Those who were engaged in the manufacture or use of steel in that former period may recall the many difficulties that were encountered in the working out of priorities, but to others it will be a fresh page out of history.

Although the United States declared war in April, 1917, it was not until July 1, 1918, that iron and steel and their products were under 100 per cent control. The intermediate steps were taken one by one. The long list of rules and regulations that eventually resulted was developed out of conferences and hearings trade by trade. Whether the experience of the other war will result in shortcuts this time remains to be seen, but events up to this time indicate that mandatory priorities will be established gradually in an effort to prevent dislocation of civilian industry as little as possible.

"What came to be known as the priority system," says Mr. Baruch in his book, "was destined to become the most characteristic feature of the whole scheme of wartime supervision over industrial forces." It was his further observation that "The priority system was, perhaps, as important as any other single factor in stabilizing prices." However, in that period the War Industries Board established fixed prices on iron and steel and many other commodities whereas in the present emergency there has been no apparent intention to exercise any control other than to prevent, if possible, unrestrained price advances. An important difference in the situation today and then is that in 1917 when we entered the war prices of iron and steel and other commodities essential to war preparations were at an inflated level.

The first step taken in the es-

tablishment of priorities in 1917 was the formation of a priority subcommittee of the General Munitions Board on May 3 of that year. It was understood that this priority committee had no power in the determination of priority in regard to civilian needs except where the Army and Navy were involved. The job was forced on the General Munitions Board by manufacturers and contractors who were asking the government which orders should be filled first. Before midsummer of that year the committee was receiving 50 to 75 of such inquiries a day.

The real work of establishing priorities did not, however, begin until early fall of 1917 after the formation of the War Industries Board with Robert S. Lovett as priorities commissioner and Edwin B. Parker as chairman of the new priorities committee.

Methods used in England were studied carefully and to some extent were copied here. Circular No. 1 issued by the priorities committee was dated Sept. 21, 1917, the day on which the price of copper was fixed and a few days before fixed steel prices were announced. The first formal priority certificate bore the date of Sept. 25, 1917.

"The great possibilities of this system," wrote Mr. Baruch, "and its necessity as a cure for the confusion of the day were not, perhaps, fully and generally appreciated, nor its full application believed to be authorized, until the reorganization of the board on March 4, 1918, from which time forward priority control became a characteristic feature of the work" of the War Industries Board.

There was little or no question of the legality of priorities. Mr. Baruch explains that the legal foundation of the right to issue priority rulings rested on a variety of statutes and principles. The committee found it did not have to depend on legal sanctions "as the spirit of service among the people made such sanctions unnecessary."

The National Defense Act of June 3, 1916, gave broad powers to the President. This law provided, as does the present "draft industry" law enacted last summer, that the government should have the right to take over and operate a plant, paying just compensation, if satisfactory arrangements could not be made with the owner.

An amendment to the Interstate Commerce Act adopted May 29, 1917, gave the government control over transportation.

Despite the broad powers which Congress gave to the executive branch of the government, priorities were issued in the form of requests, but actually, says Mr. Baruch, "they had all the force and vigor of orders, since every concern affected knew that if it did not comply its supply of fuel might be cut off, its materials and supplies might not be received for transportation, or its establishment might be seized by the government."

The iron and steel industry was the first to be placed under the priority committee's rulings. "Extreme shortages were the order of the day," Mr. Baruch commented. Something had to be done about it to insure a supply of steel for essential purposes.

Priorities were at first placed in three classes, A, B and C. Then there were sub-classifications such as A-1, A-2 and so on and B-1, B-2, etc. All A priorities took precedence over all B priorities and all B likewise took precedence over those in C ratings. Class A covered war work of all kinds, but particularly the requirements of the Army, the Navy and the Emergency Fleet Corp. Class B ratings were given to those requirements not essentially for the war but important nevertheless from the standpoint of national welfare. Class C covered everything not included in A and B, but these orders required no certificate of priority, but merely fell automatically into that deferred classification. Any order not accompanied by a certificate of priority was placed in Class C.

Under this method of establishing ratings there was at first some conflict between the Army and Navy and the Emergency Fleet Corp., but this was ironed out by an order from the President that no commandeering of supplies could be done without the approval of the chairman of the War Industries Board.

When the system was started on Sept. 21, 1917, all orders which had been placed prior to that date on behalf of the Army, Navy and Emergency Fleet Corp. were automatically rated Class A-1. All military supplies and equipment fell into Class A-2.

On July 1, 1918, a circular was issued which placed all manufacture and production of raw materials, with the exception of foods,

Steps Taken in Use of Priorities in 1917-18

May 3, 1917. Priority subcommittee of General Munitions Board formed.

September, 1917. War Industries Board organized with Robert S. Lovett as priorities commissioner.

Sept. 21, 1917. Circular No. 1 issued by new priority committee.

Sept. 25, 1917. First formal priority certificate issued.

March 4, 1918. Reorganization of War Industries Board brought priorities more strongly into use.

July 1, 1918. Circular issued placing all manufacture and production of raw materials, with the exception of foods, feeds and fuels, under 100 per cent priority control.

Coming Events

Jan. 27 to 30 — American Road Builders Association, annual convention and show, New York.

Feb. 7 to 8—Iron, Steel and Allied Industries, annual conference, Del Monte, Cal.

March 25 to 29—American Society of Tool Engineers, Machine and Tool Progress Exhibit, Detroit.

April 16 to 18—Electrochemical Society, Inc., spring meeting, Cleveland.

April 23 to 25—Concrete Reinforcing Steel Institute, annual meeting, Hot Springs, Va.

May 5 to 7—American Gear Manufacturers Association, annual convention, Hot Springs, Va.

May 12 to 15 — American Foundrymen's Association, annual meeting, New York.

feeds and fuels, under priority. From then on priority control was rapidly extended. New classifications were adopted. Class AA was set up to cover most urgent requirements and a deferred classification designated as Class D was added. The priority committee also set up automatic ratings. A system had been worked out so that Suppliers knew at once into which rating an order should be placed. Each alphabetical rating was limited to four sub-ratings; that is in the A group there was nothing higher than A-4.

Only those manufacturers who were engaged in non-essential lines were seriously handicapped by the extension of priorities to a large volume of iron and steel production and ultimately to the entire production. The widespread use of priorities is shown by the War Industries Board report of 211,430 applications received between Sept. 25, 1917, and Nov. 11, 1918, and of these only 27,917 were denied or withdrawn. The test which the priority committee applied to each application was this: "To what extent, if any, will the granting of this application contribute directly or indirectly toward winning the war; and, if at all, how urgent is the need?"

Obviously some industries suffered restriction of output. For example, the automobile industry, which produced 1,878,778 cars and trucks in 1917, dropped to an output of 935,746 in 1918, when priorities had become more stringent.

No industry was absolutely prohibited from getting iron and steel. There was no plan of general curtailment, but there was automatic curtailment by virtue of the fact that operations in non-essential lines were restricted in their production by the transportation, fuel and materials that was available to them.

A survey made by the War Industries Board developed that only 25 industries could be definitely selected as producers of non-war articles. The aggregate capital of these was $733,000,000 and they employed a total of 283,518 workers. It was decided that if all of these industries were shut down the relief afforded would be negligible, and, moreover, complete prohibition of materials to them would have been injurious to local and national welfare and might have brought about the disintegration of these industries. It was felt that normal restrictions, such as conscription of workers, curbing of imports and the priority regulations, would accomplish the desired results. Current thought in Washington is probably traveling along the same lines.

The brewing and jewelry industries were typical of those which were in the non-war classification. There were many conferences with these and other non-essential industries, but no drastic action was taken against them. All orders from non-essential lines were placed in Class D. Thus they were not cut off, but they had to wait their turn after essential requirements had been provided for. Jobbers were placed in B-4 category, but a pledge was exacted that there be no hoarding of stocks. All non-essential lines were urged to curtail output as much as possible.

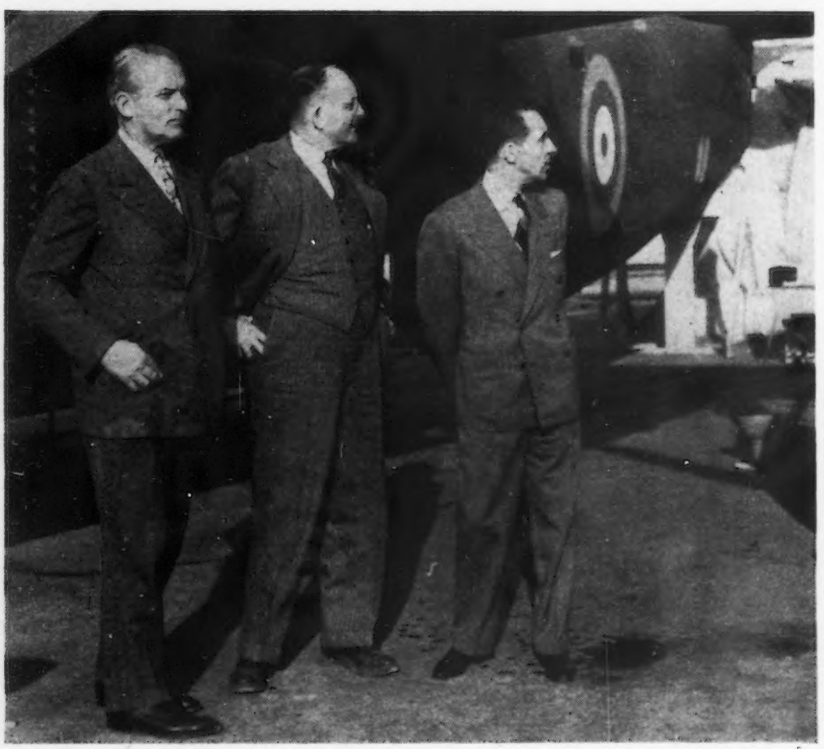
There were many controversies, naturally. The Mayor of New York took umbrage because steel was not made available for the construction of public schools. But industry knew that it must conform to the rules and regulations in order to keep running at all.

Iron and steel were the principal items affected by priorities. As Bernard M. Baruch phrased it, "The iron and steel industry was, on the whole, one of the most important centers of approach to the control over the vast number of manufacturing industries which the progress of the war was making necessary."

With mechanized warfare a greater factor than in 1917-18 and with the growth in the use of steel in civilian requirements since that period, it may be expected that the use of priorities on a large scale, if that should come, will affect the steel industry and its customers first and foremost.

FORD BOMBERS?: At the Consolidated Aircraft plant, San Diego, Cal., where B-24 bombers are being built, Edsel Ford (above with Maj. Reuben Fleet and Charles E. Sorensen) told newsmen: "This is just an inspection trip for the purpose of examining the big Consolidated bomber. If we believe it practical the Ford Co. will build either parts for the ship, or we may even build the entire ship."

Photo by International



You Pay the Same for Power--Delivered or Dissipated!

Mr. Young and Mr. Falk Discuss Roadbeds for Power

Why Falk Engineers Installed DODGE-TIMKEN Pillow Blocks on Annealing Furnace and Foundry Trucks

Dodge-Timken Clamp Sleeve Bearings are used on these Motor Driven Winches in Falk's Welding Shop and Foundry in Milwaukee to pull loaded trucks into gigantic annealing ovens...They deliver the power that rolls tons of gears into these huge furnaces for annealing . . . A 20,000-pound pull on the cable is handled by Dodge . . . Annealing Truck, when loaded, carries a total weight of 200,000 pounds on six Dodge-Timken Clamp Sleeve Pillow Blocks . . . Harold Falk, Jr. discusses "Bearings" with Frank Young, Dodge Engineer.

Mr. Falk: Why do you suggest that we put Dodge-Timken Clamp Sleeve Bearings on this Main Shaft as well as the Foundry Trucks?

Mr. Young: Because they offer full radial and thrust load capacity — and they are fully self-aligning.

Mr. Falk: All right — but why Clamp Sleeve?

Mr. Young: Clamp Sleeve Bearings can be quickly clamped in position on commercial cold rolled shafting instead of special turned shafting to take press fit. They can handle those shock loads — because of the full-length sleeve the load is distributed over the entire length of the bearing — reducing pressure per square inch.

Mr. Falk: How will they stand up?

Mr. Young: Remarkably well—because they are equipped with special indestructible steel seals which keep out all dirt.

Mr. Falk: Well, how about costs?

Mr. Young: Low friction, infrequent lubrication and little or no maintenance . . . all combine to give dependable and trouble-free operation.

Mr. Falk: O.K. — Dodge they'll be.

Dodge they are and have been for many years...Dodge power transmission units have enviable performance records in every branch of industry. For built-in production machine application...or for power transmission...depend on Dodge.

DODGE MANUFACTURING CORPORATION
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• We favor adequate preparedness for national defense, and recommend enlistment in the U. S. Army to eligible young men.

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DODGE
MISHAWAKA
Power Transmission

THE RIGHT DRIVE FOR EVERY JOB

More Coordination of Defense Program Urged By Steel Men

Pittsburgh

• • • **Major criticism of the** national defense program, as it relates to the steel industry, centers on lack of coordination and cooperation, coupled with too much red tape on the part of most of the governmental agencies involved, according to a survey made by THE IRON AGE.

Interviews with steel officials indicated that definite progress is being made between the government and the industry toward expediting the national defense program, but it was definitely pointed out that national defense production as it pertains to steel has in no wise been retarded since the country began to rearm. Furthermore, an air of constructive criticism was noted and several executives were of the opinion that a change of attitude between both government authorities and industrialists would do much toward clearing up many misunderstandings.

Most steel and metal working executives here believe that the Government should bring about closer cooperation between the Army and the Navy, the Defense Advisory Commission and the Treasury Department, especially on such matters as amortization of equipment, the sole use of which will be for armament, and a prompt and proper disposal of the controversy on "escalator" clauses in Government contracts.

Industrialists in their own name are reluctant to talk much about "escalator" clauses since many of them believe they will be misunderstood and labeled as non-cooperative, regardless of the logic in their reasoning and suggestions. It was pointed out that business concerns find it difficult to establish prices on contracts which are apt to run for a period longer than a year, especially in view of the uncertainty in raw material and labor costs. Simply stated, about all industry wants is a clear-cut authoritative decision on the part of all the Government agencies involved that fair treatment will be accorded companies which subsequently face higher costs than were figured on when the original contract was made.

While some governmental agencies have agreed to a setup which would bring about this condition, other branches of the Government, some of which have final say on the payment of bills, have been unable to reconcile their differences with other governmental agencies.

Getting down to brass tacks and forgetting the mistakes that may have been made in the past, there was a general willingness of those interviewed to franky speak their mind on how industry and government can help in the future.

Outstanding suggestions on how industry can help, especially the steel industry and closely allied metal working companies, are summarized as follows:

1. An attitude of wide tolerance and constructive criticism without the injection of too much controversy and contention.

2. Industry should exercise extreme caution not to put itself in a position where it can be charged with responsibility for delays in national defense production.

3. The steel industry and allied branches should keep a careful watch over its own commercial obligations and see that it does not contribute to the building up of unreasonable inventories for purposes other than national defense. In other words, those companies who are already practicing voluntary priorities and those who have not done so should police their incoming business so that a proper rationing of steel is made to those customers whose products are not essential for national defense.

4. Industry should be certain that its individual members share in the national defense program and production to the full extent of their relative position in the industry.

5. By adopting an overall understanding of the national defense program, and subordinating as many things as possible which tend to prevent such an understanding.

Outstanding suggestions as to how the government can help are summarized as follows:

1. Industries or concerns which are doing a good job should be left alone to handle it rather than piling on additional responsibilities just because the original job is being properly expedited.

2. Those interviewed unanimously suggested that "politics" has no place in the national defense program and the injection of extraneous ideas and maneuvers into the rearmament projects can do nothing but retard the reaching of desired goals.

3. Publicity and "inspired" columns throughout the nation's press have in some instances been originated by some government people not thoroughly familiar with the problems and have created unwarranted differences of opinion and general misunderstanding. Important

No Steel Shortage In U. S., Bank Finds

Cleveland

• • • **The U. S. defense program, together with British orders for armaments and raw steel, probably will not require as much as one-fifth of our steel making capacity, says the Monthly Business Bulletin of the Cleveland Trust Co.**

"In addition to producing steel for military and naval needs of the United States and the British Empire, the steel industry has capacity available for all domestic needs 15 per cent greater than the amount of steel produced for domestic consumption in 1929," says the bulletin. "Steel making capacity has increased more rapidly than the growth of population.

"No shortage of steel is impending and there is no reason at all why a shortage should be allowed to develop if reasonable precautions are taken to avoid use of large quantities of steel in connection with non-essential civilian projects."

problems can be solved through conference between industry and government officials without the release of reams of publicity, some of which has not been founded on fact.

4. Some people interviewed expressed a conviction that the ironing out of differences between the Army, the Navy and the Defense Commission would do much towards removing some of the stumbling blocks along the path of national defense. It is a well known fact in industrial circles that many specifications, besides being too numerous, are far more strict than is necessary to do a reasonable and satisfactory job. Such matters, it is said, can be ironed out by conferences with the proper authorities on both sides.

5. Some progress has been made and steel makers think much more can be accomplished through a wider application of bessemer steels where open-hearth steel had previously been specified. The industry admits that there are probably many cases where bessemer steel would not be desirable but it is said there are innumerable applications where bessemer steel would be satisfactory and the result could only mean a greater total production of steel ingots for national defense purposes. Given the supplies of coke and pig iron, the production of bessemer steel could reach higher levels than current rated capacities which were drastically reduced a few years ago. Some sources believe that the potential output of bessemer steel could better present rated capacity by at least 35 per cent.

Many miscellaneous sugestions were put forth and examples given, such as: Sheared plates being ordered when universal plates could be taken right off the mill and serve just as good a purpose only saving several weeks in delivery; the machining of certain ordnance parts to the extent of an 80 per cent scrap loss instead of using forged parts; the ordering of material for one project so far in advance that this particular portion is completed long before other important segments.

WATCH THOSE FINGERS: On this Cincinnati shear a Westinghouse Phototroller has been attached to safeguard operators. When the operator's hand interrupts the light beam, the photocell device automatically prevents operation of the machine.

Aircraft Engine Part Contracts Let by Navy

Washington

• • • **The Navy Department** announced that it had entered into contracts with the following companies for the expansion of plant facilities:

New Process Gear Corp., Syracuse, N. Y., for the construction, acquisition and installation of additional plant facilities and equipment at Syracuse, N. Y., at a cost of $348,000 (for manufacture of aircraft propeller parts).

Hartford Machine Screw Co., Hartford, Conn., for construction, acquisition and installation of additional plant facilities and equipment at Hartford, Conn., at a cost of $469,000 (for manufacture of aircraft engine parts).

The New Britain Machine Co., New Britain, Conn., for the acquisition and installation of additional plant facilities and equipment at the plant of that corporation at New Britain, Conn., at a cost of $409,000 (for manufacture of aircraft engine parts).

Perkins Machine & Gear Co., West Springfield, Mass., for the construction, acquisition and installation of additional plant facilities and equipment at West Springfield, Mass., at a cost of $365,000 (for manufacture of aircraft engine parts).

Aviation Corp. (Republic Aircraft Products Division) Detroit, Mich., for the construction, acquisition and installation of additional plant facilities and equipment at Detroit, at a cost of $532,000 (for manufacture of aircraft engine parts).

Palmer Heads Federal Housing Contractors

Washington

• • • **President Roosevelt** has appointed Charles F. Palmer, Atlanta building contractor, czar of all federal housing activities by appointing him chief of a new division of Defense Housing Coordination. Mr. Palmer, who headed the Office of Defense Housing Coordinator in the National Defense Advisory Commission, will be responsible only to the White House.

Iron Ore Output Rises 43% In 1940

Washington

• • • **The Bureau of Mines** estimates the 1940 iron ore output in the United States at 73,806,000 gross tons, an increase of 43 per cent over the quantity mined in 1939 and, except for 1916 and 1917 the largest of record. The Bureau's figures exclude ore that contained 5 per cent or more manganese in the natural state. It was stated that the steel industry operated at 73 per cent of capacity the first and second quarters of 1940, 88 the third quarter and 95 the last quarter, thus establishing an all-time record.

The Bureau said that operating schedules at iron ore mines in the Lake Superior district were keyed to meet not only the 1940 requirements but to build up stocks at docks and furnaces sufficient to last until the 1941 navigation season opens.

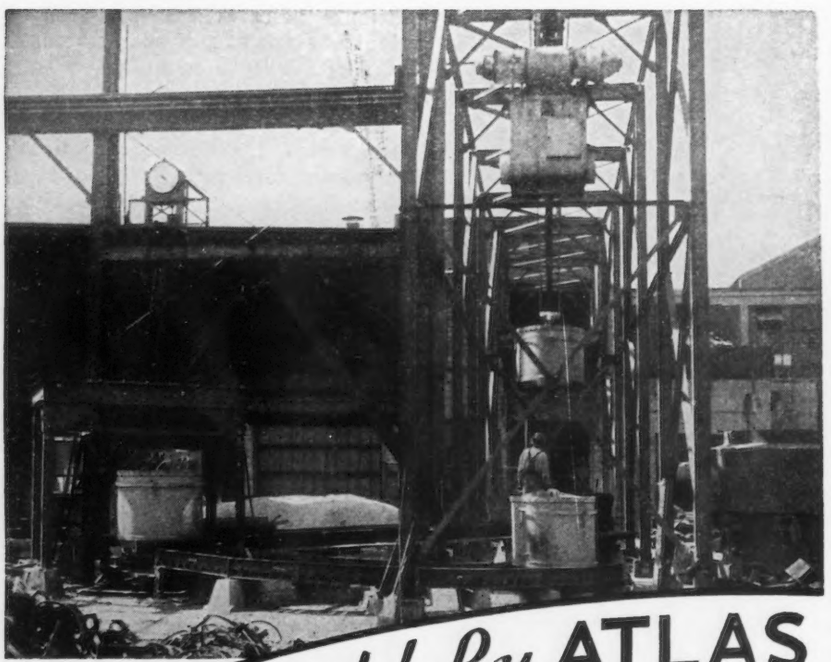
To accomplish this task, the entire ore fleet was engaged part of the season. It was pointed out that, although severe storms on the Great Lakes in November resulted in the movement of about 2,000,000 tons less than expected, shipments down the lakes for the season exceeded 63,000,000 tons and were the third largest ever carried.

The ore shipped from mines last year is estimated at 74,969,000 gross tons, valued at $191,734,000, an increase of 37 per cent in quantity and 21 per cent in value, compared with 1939. The average value of the ore at mines in 1940 is estimated at $2.56 per ton compared with $2.89 in 1939. The stocks of ore at the mines at the end of 1940, mainly in Michigan and Minnesota, were 3,502,000 tons, a decrease of 26 per cent under the preceding year.

The Lake Superior district shipped by rail and water 62,921,000 tons last year, or about 84 per cent of the total shipments and produced 61,808,000 tons, gains of 41 and 48 per cent respectively, over its 1939 shipments and output. Valued at $165,907,000 Lake Superior shipments last year were 21 per cent over the 1939 value. The average value per ton of Lake Superior ore at the mines in 1940 was $2.64, compared with the 1939 average ton value of $3.07. In ad-

Scrap Institute Moves Office to Washington

• • • The Institute of Scrap Iron and Steel, whose national executive offices have been at 11 West 42nd Street, New York, are being moved to the Normandy Building, Washington, D. C., where E. C. Barringer, national executive secretary, will make his headquarters for the duration of the war emergency.



An Assist! By ATLAS

View at Prominent Iron Foundry

To Lower Costs!

Here Atlas - designed, Atlas - built equipment moves heavy scrap and other charging materials with consummate ease.

Monorail deposits empty bucket on roller conveyor. Bucket *rolls down* to scale platform, is charged with iron, weight read from yard crane cab. Scale platform lowers, turns, bucket *rolls down* to monorail for pick-up and charge to cupola.

A propitious circle, presaging profit at the year-end—and a definitely typical Atlas installation.

THE ATLAS CAR & MFG. CO.

Engineers **CLEVELAND, OHIO** ***Manufacturers***

serving the world with mobile handling equipment

dition Lake Superior shipments of manganiferous ores last year were about 1,204,000 tons compared with 651,963 tons in 1939.

Stocks of ore in the Lake Superior district at the close of 1940 were 3,342,000 tons, 26 per cent less than at the end of 1939. According to the Lake Superior Iron Ore Association, the bureau said, Lake Superior ore in stocks at furnaces and Lake Erie docks on Dec. 1, 1940, was 41,711,704 tons compared with 40,732,096 tons in 1939.

Production of iron ore in the Southeastern states approximated 7,239,000 tons in 1940, a 20 per cent increase over 1939, and shipments rose to 7,232,000 tons, an increase of 24 per cent over 1939 shipments. The average values per ton were $1.73 and $1.67, respectively. Stocks at the end of 1940 were 15,000 tons compared with 9981 tons at the close of 1939.

The Northeastern states mined 3,547,000 tons in 1940 an increase of 14 per cent in 1939. These states include the Adirondack district of New York and the Cornwall district of Pennsylvania. Virtually all of the output in this area is magnetite and shipments from the mines totaled 3,610,000 tons valued at $11,353,000 or increases of 17 and 22 per cent, respectively, in quantity and value, compared with 1939. The average values per ton were $3.14 and $3, respectively, and stocks decreased to 139,000 tons at the end of 1940 from 208,421 at the end of 1939.

Western states produced 1,212,000 tons last year and shipped 1,206,000 tons valued at $1,929,000. In 1939 production was 917,448 tons and shipments were 914,537 tons, valued at $1,495,733. The states embraced in this category are California, Missouri, South Dakota, Utah, Washington and Wyoming.

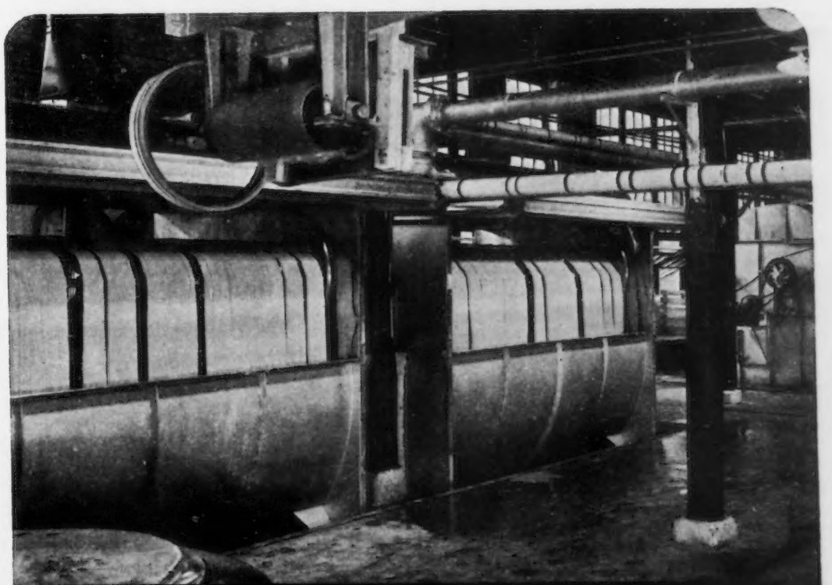
Imports of iron ore reported for the 11 months ended Nov. 30, 1940, were 2,308,338 tons, valued at $5,875,925, compared with 2,412,515 tons, valued at $5,865,510 for the entire year 1939. The reported exports for the 1940 11-month period was 1,385,792 tons, at $3,578,086 for the entire year 1939. Virtually all of the 1940 exports went to Canada. Chile supplied about two-thirds of the imports.

York Gets Defense Jobs by Teamwork

York, Pa.

• • • **The success or failure** of the "York Plan" for producing national defense material depends solely upon one thing—unrestricted and full-hearted cooperation among various manufacturers who initiate such a program. This much has been told to THE IRON AGE by those at York, Pa., who more than six months ago conceived the plan that is now being used as a model throughout the country.

The plan is working so successfully here that there is little or no question on the carrying out of the initial setup. As a matter of fact, a representative of the Ad-



How a Fabricator Saved $9,447.50 for a Customer

• This isn't a balance sheet of a fabricator's savings. It's about his *customer:* how a textile mill saved $9,447.50 in operating costs in one year, and how these savings paid for the ARMCO Stainless Steel equipment in *less than two years.* That means something to this fabricator's prospects, doesn't it?

The ARMCO Stainless Steel was used in dyeing machines. The installation is as good as new; savings go on and on. Here is the evidence:

Six machines made of ARMCO Stainless Steel produce as much as the 12 wooden vats they replaced.

Electric power, steam costs halved.

24 loadings and unloadings of material—84 once needed.

Cleaning costs cut in half.

Man-hours saved: 120 a day.

Potential mill capacity doubled.

Could *your products* work better, save more and sell faster made of ARMCO Stainless Steel? We shall be glad to place our research facilities at your disposal. Write The American Rolling Mill Company, 501 Curtis Street, Middletown, O.

ARMCO ARMCO **STAINLESS STEELS**

visory Committee to the Council on National Defense recently wrote to one of the founders of the York Plan, saying that "the York Plan of cooperation impresses me as being something that should be copied throughout the United States. It is just good horse sense applied to America's No. 1 problem."

By now the features of the York Plan are well known. Briefly, about six months ago members of the York Manufacturers Association formed a National Defense Committee whose duty it was to make a complete survey of all industries in that area as to machinery available, and defense products capable of being manufactured. This data was centrally located so that if a member were to bid successfully upon a national defense project, he could tell beforehand just what parts he could sub-contract.

The prime motive of this plan was to bring as much national defense business to York as possible, and to enable the complete utilization of existing facilities. Ordinarily, an area lacking such a coordinated and cooperative plan, might, in many instances, lose a national defense order, which could have been completed were such a setup in effect. Or, an industrial concern might successfully bid on a national defense job and be forced to sublet certain features of it to industries outside its own area. The York Plan precludes such a situation because all the manufacturers here are already well versed on available machining capacity, etc., so that any one of them does not hesitate to bid upon a major proposition following a rapid check with the local Defense Committee as to whether or not certain portions of the contract which the company is bidding on, and which they are not in a position to produce, can be sublet to other companies in this locality.

A prime example of the actual working of this plan would be somewhat as follows: An industrial concern here, after proper checking, with the central files on available machining capacity, etc., would bid on a national defense project. If this company were successful in its bid, it is entirely possible that several portions of this work would be sublet to not only one, but in some cases, as many as three or four other companies. The original company which successfully obtained the order would, of course, assemble the work in its own shop.

There is nothing complicated about the York Plan, and possibly the only reason the same success has not been obtained in many other areas might be the lack of coordination or cooperation. The York Manufacturers Association was founded in 1906 and is based upon a "good neighbor" policy, and it is undoubtedly this condition which is today paying dividends to this community where more than $25,000,000 worth of defense work has been produced or is under production, and where unused capacity is being utilized with little or no building of additional equipment.

The success of this plan has caused York manufacturing officials to set out to make a careful survey of mechanics, so that as the demand for man power presents itself, the York National Defense Committee will know where these men are engaged, possibly in unskilled jobs, or in plants not engaged in defense work.

It has been said that the York Plan might not work as easily in many other communities because this area is fortunate in having a great number of diversified industries, as well as products. Interviews with York industrialists, however, do not reflect this opinion since the entire success of such a community undertaking is based upon a mutual advantage to the area as a whole. The predominance of metal working industries in this area is duplicated to some extent in Western Pennsylvania, Ohio, and the Chicago areas, and already strong moves are under way in those territories, as well as others, toward rapidly putting into practice plans similar to that in effect here.

Beaver County, Pa., has already formed a National Defense Com-

FLUOR SPAR

Guaranteed 85% plus in Calcium Fluoride Not to exceed 5% silica In bulk

HILLSIDE FLUOR SPAR ROSICLARE

Barges 500 tons Ohio River from our river loading station at Rosiclare

Rail shipments from Rosiclare, Ill., on Ill. Cent. RR

WASHED GRAVEL

HILLSIDE FLUOR SPAR MINES

38 So. Dearborn St. Phone: Ran. 1151

CHICAGO, ILL.

mittee of Manufacturers and civic bodies, and has completely surveyed available industrial equipment for the production of national defense items. A move is under way at Pittsburgh along the same line, whereby a central bureau, through which manufacturers may obtain names and data on companies capable of doing subcontracting work, would be organized. News of the same nature is emanating daily from all parts of the country.

It is noteworthy that the York Plan was established and has been kept going by the work of manufacturers. W. S. Shipley, Board Chairman, York Ice Machinery Corp., is chairman of the York Defense Program Committee, and is assisted by W. J. Fisher, vice president and general manager, A. B. Farquhar Co., R. P. Turner, vice president, New York Wire Cloth Company, W. C. Bulette, president, Brandt-Warner Mfg. Co., and R. E. Gephart, secretary, York Manufacturers Association. These men represent such varied industries as ice machinery, farm implements, wire cloth, and automobile axles.

Niagara Machine's Backlog Mostly for U. S. Aircraft Plants

• • • **Heavy orders for** large presses and shears to be used in U. S. aircraft plants and other defense industries resulted in the current expansion program of Niagara Machine & Tool Works, Buffalo, according to officials of the company. Niagara Machine's backlog consists almost entirely of domestic orders.

Heller Bros. Bar Mills to be Operated

• • • **Heller Brothers Co.,** Newark, N. J., states that its bar mills, which have been idle for some time, will go into operation the early part of the second quarter. The company will roll bars from ¼ in. to 1½ in. in rounds, squares, octagons and hexagons in various grades of alloy and carbon steels to specified SAE analyses.

Orders Placed for 25,000 Electric Refrigerators

Detroit

• • • **Orders totaling** 25,000 electric refrigerators for the United States defense housing projects have been received by the Kelvinator Division of Nash-Kelvinator Corp.

Midvale Gets $1,658,208 Contract for Armor

Washington

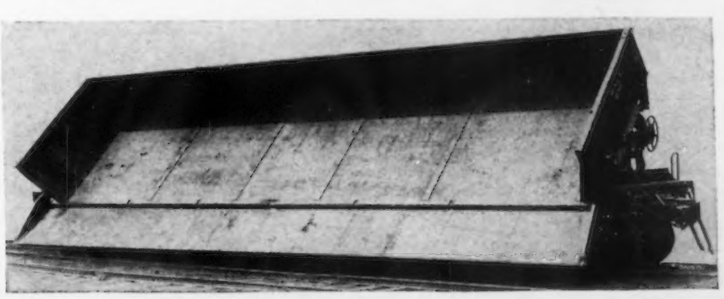
• • • **Announcement** was made last week by the Navy Department of a $1,658,208 contract awarded the Midvale Co., Nicetown, Philadelphia, for the manufacture of armor.

I MADE THE MISTAKE ONCE . . . of thinking waste disposal costs could not be reduced

"Once is enough to make a mistake—and this one cost money. I didn't realize how much until I installed the new Koppel 50-yard air-dump (which can take up to 65-yards) and saw waste disposal efficiency increased 60%—with a 27% reduction in initial cost! Take a tip from the lesson I learned —install the big Koppel Air-Dump car and *dump* your excess costs."

Would you like to know the details?

KOPPEL



In several large plants Koppel fifty cubic yard air dump cars have actually produced the savings mentioned above. May we furnish the facts?

PRESSED STEEL CAR CO., INC.
(KOPPEL DIVISION)
NEW YORK PITTSBURGH CHICAGO

PLATERS PRAISE RACK INSULATION!

UNICHROME* RACK-COATING-W "FINEST MATERIAL I EVER USED!" LICENSEE SAYS

NEW YORK, JANUARY 23. —Much attention is being attracted in the plating field by the ability of United Chromium's "Unichrome" Rack-Coating-W to provide perfect rack insulation over long periods of severe, continuous service without deterioration. Leading platers report this rack insulation to be " . . . Finest material I ever used!"—"No sign of breakdown after 1000 plating cycles" — "Racks in perfect condition after three months"—"Easy to rinse"—"Perfectly satisfactory!"

Important advantages of this plating rack insulation—advantages which users verify—are:

UNICHROME* RACK COATING-W

1. Withstands boiling cleaners and all plating solutions.
2. Tough—withstands wear and tear of handling.
3. Contains no ingredients harmful to plating solutions.
4. Cuts costs—reduces frequency of recoatings.
5. Easy to apply—"dip and force dry" method.
6. Light in color—easy to see how well the rack is covered.
7. Any part of rack can be recoated without recoating entire rack.

Write for Bulletin 15

Containing Complete Information

Platers without rack coating facilities may have their racks coated with "Unichrome"* Rack-Coating-W by Chromium Corporation of America, 4645 West Chicago Avenue, Chicago, Ill.; Belke Manufacturing Company, 947 North Cicero Avenue, Chicago, Ill.; or Lea Manufacturing Company, Waterbury, Conn.

UNITED CHROMIUM
INCORPORATED

51 East 42nd Street, New York, N. Y.
2751 East Jefferson Ave., Detroit, Mich.
Waterbury, Conn.

*Trade Mark Reg. U.S. Pat. Off.

Rearming Is Primary Job, Republic Officials Say

Cleveland

• • • **Every other consideration** is secondary to the vital objective of rearming and without reservation the steel industry is cooperating fully, states a letter to stockholders of Republic Steel Corp. signed by T. M. Girdler, chairman of the board, and R. J. Wysor, president.

The letter went to approximately 52,000 holders of Republic common stock, who received a dividend of 40c. a share, totaling more than $2,250,000.

The steel executives pointed out that while the national defense program is giving major impetus to the industry, actual steel requirements for domestic defense and for export to Great Britain and Canada are not great as compared to the country's total steel capacity.

"The steel industry's co-operation takes many forms," says the letter. "Not only is it endeavoring to meet the government's requirements for many kinds of special steel products, but it is supporting the government's effort to avoid the disaster of inflation. Basic steel prices have remained unchanged in the face of heavy demand and are likely to continue so unless costs are seriously increased.

"The defense program has only one purpose, and that is the production of armaments. To that purpose every other consideration must be secondary."

Plastics Studied to "Free" Vital Defense Materials

• • • **Monsanto Chemical Co.** is launching a program to study uses for plastics materials to free strategic metals for defense needs, it was disclosed by Thomas S. Carswell, director of plastics research for Monsanto.

"In view of the heavy demand for aluminum, brass, copper and zinc and certain types of steel in the defense program, the possibility of replacing these metals in many consumer products with synthetic plastic compounds is commanding our attention," Mr. Carswell said.

Nash-Kelvinator Plant At Racine to Reopen

Racine, Wis.

• • • **A $3,000,000 order for** construction of two-wheeled Army trailers is the reason for Nash-Kelvinator reopening its Racine plant, closed since mid-1938.

NEW SUBMACHINE GUNS: The above photograph shows a new H. R. Reising submachine gun being assembled. The gun may be completely stripped and reassembled in 45 sec. without tools and are being made at the rate of 500 a day at the Harrington & Richardson Arms Co. plant in Worcester, Mass.

Photo by Harris-Ewing

Tin Output Higher in Netherlands Indies

Washington

• • • **The increased demand** for tin in the American market, coupled with the action of the International Tin Committee in raising production quotas for the year ending June 30, 1941, has resulted in stimulating appreciably the output of this metal in the Netherlands Indies, according to the Metals and Minerals Division, Department of Commerce. Because of the control exercised by the local government over the administration of two of the largest producing companies, it is expected by authorities that Netherlands Indies will have no difficulty in meeting the augmented quota set by the Committee. It is reported that the Indies already have gained a considerable lead on other tin producing areas since the increased quota went into effect and that only the Netherlands Indies and Nigeria are expected to be able to deliver tin to the full extent of their respective allotments during the current quota year.

An added incentive to increased production is seen in the maintenance of a satisfactory price for tin in world markets. Some local sources attribute present remunerative prices to the influence of the United States Metals Reserve Corporation in purchasing substantial stocks of tin for emergency purposes.

6 Freighters Ordered From Burrard Drydock Co.

Vancouver, B. C.

• • • **Hubert Wallace,** manager of Burrard Drydock Co., reported that his company has received orders from the British Government to construct six freighters totaling about 60,000 tons. The ships will cost about $2,000,000 each, and will be 416 ft. in length with a beam of 56.10 ft. and carrying capacity between 9000 and 9500 tons. They will be powered by steam and will have speed of about 10 knots. The first keel will be laid some time in April, and the first ship launched in about a year's time. Other launchings will follow at two- or three-month intervals, with the entire order to be completed in about two years.

Plastic Cement Coating For Galvanized Steel

• • • **Where galvanized siding** and roofing material is subject to accelerated corrosion, such as on docks and wharves on seaboard, a flexible type of cement coating has been developed. It can be sprayed or brushed on the corrugated or flat sheets either at the mill or warehouse or at the erection site. Wet-X-Hale Builders Plastic, as it is called, is an oil base portland cement product combined with various indestructible fine aggregates, so processed as to become a smooth working plastic medium. It produces a firm, tough and flexible finish in texture effects as shown in the illustration, where galvanized sheet so coated has been bent and twisted. It is said to be non-peeling and non-cracking, has sound deadening properties and can be provided in many colors. The coating can also be applied to other materials including structural steel and wood. It is suplied in paste form and is reduced to a primer. The maker is the Rogear Co., 11 Water Street, New York.

Monarch Machine Tool Production 50% Higher

• • • **January production** of Monarch Machine Tool Co., Sidney, Ohio, is running 50 per cent over that of January, 1940, and will be increased still further as the year progresses, it was announced by Wendell E. Whipp, president of the company.

Nineteen-forty production of Monarch lathes, Whipp said, showed an increase of 240 per cent over 1939 output, and the company has a thousand employees today as compared to 648 a year ago.

Freight Car Loadings 6.5% Above 1940 Week

• • • **Freight car** loadings for the week ended Jan. 11 totaled 711,675 cars, according to the Association of American Railroads. This means an increase of 6.5 per cent over the corresponding week in 1940; of 22.2 per cent over 1939, and of 15.9 per cent above the preceding week.

The most significant and biggest change compared with last year's figures was in the increase of 24.7 per cent in ore car loading, amounted to 12,612.

12 years ago $2,200 was spent installing this "straight line" Reading system in the boiler room of a large textile plant. Repairs and maintenance have averaged less than 1% per year. Savings in handling costs have averaged $3,878 per year. Other benefits include —ability of engineer to handle turbine room as well as boiler room—more constant, even firing of boilers to provide maximum B.T.U. conversion—elimination of dirt and dust.

Today — Reading's *Unit Construction Plan* of Hoist Building would reduce the cost of a similar installation by more than $200 — because a *standard* mechanism could be used as a base for the design.

This Plan provides 144 combinations of basic units to meet unusual conditions—144 standard price Answers To Your Hoisting Problems. Write for this free booklet.

READING CHAIN & BLOCK CORP.
DEPT. 31 **READING, PA.**

READING
Chain Hoists, Electric Hoists, Cranes and Monorails

Largest Armor Plate Heat-Treating Plant Completed by A.C.F.

• • • **In a talk given on Jan. 16** before the New York Railroad Club, Frederick A. Stevenson, vice-president for operations of the American Car & Foundry Co., indicated that the company has recently completed at its Berwick, Pa., plant what is now the largest installation of armor plate heat-treating equipment in the world. The setting up of this division of the ordnance plant was begun in 1939 when it was found that case carburized plate could not be obtained from the only two outside suppliers in time to meet the schedules of the first Army contract for 329 tanks, the first of which had to be delivered within 200 days of signing of the contract. Today, the company has in operation 16 carburizing furnaces, 9 annealing furnaces and 21 heat-treating furnaces. The armor plate plant occupies 200,000 sq. ft. of floor space.

Together with production for new tank contracts and orders for carburized plate from other manufacturers, the company has an order backlog of 14,000 tons of finished armor plate. Production of case hardened plate is at the rate of 1000 tons per month. The company purchases low carbon plate from regular mill sources.

Mr. Stevenson indicated that his company had delivered its first tank 16 days prior to the contract date and completed delivery of the entire order of 329 tanks in December, 1940, while the contract completion date was Jan. 11, 1941. The original contract was signed Oct. 23, 1939. In March, 1940, a second contract calling for 3089 combat tanks, was signed with the Ordnance Department of the U. S. Army, and in addition A.C.F. has taken orders for 1050 sets of running gear for British and Canadian tanks, besides armor plate orders to equip 3439 half-track combat cars made elsewhere.

Light combat tank production is now at the rate of four per day and by Sept. 15 production will reach 15 per day, Mr. Stevenson said. The British running gear sets are equivalent to the production of four complete tanks a day, making A.C.F. the largest private producer of tanks in this country. Altogether, over 300 machine tools have been purchased for the tank plant and an additional 202, mostly planers and radial drills, for the armor plate plant.

Henry N. Ensign, manager of the ordnance plant at Berwick, illustrated tank production with a number of slides. Entertainment by the Berwick plant glee club filled out the evening. The affair was held in the Engineering Societies auditorium.

20th Edition of Coal Directory Published

• • • **National Coal** Publications, Law Bulletin Building, Pittsburgh, announces the publication of the 20th edition of "MacQuown's Coal Directory and Buyers Guide," available to persons interested in production, sale, transportation or consumption of coal and coke, at $15 a copy and (abridged edition) $10 a copy.

RUSHING SHIPS FOR DEFENSE: Work at U.S. shipyards is being rushed 24 hr. a day. This night scene is at the Bethlehem Steel Co.'s repair docks along the Key highway, Baltimore. *Photo by Wide World*

Revere Reports New Roofing Product

• • • **Rocan, a new product** in the roofing and building fields, is announced by Revere Copper & Brass Inc. Longer life and better resistance to corrosion fatigue than ordinary copper are claimed for it by the company. Rocan is available in standard stock sizes in sheets, rolls and strips which are applied in the same manner as commercial sheet copper. Rocan sells at a premium of 1c. a pound over standard rolled and strip copper.

Revere's research department has found that electrolytic refining removes, along with other impurities, certain elements which tend to prolong the life of copper roofing and sheet metal work. By the reintroduction of some of these minor constituents in controlled amounts, Revere reports it obtains in Rocan a material that forms a better protecting film.

Alabama Coke Ovens To be Rehabilitated

Birmingham

• • • **The Debardeleben** Coal Corp. has announced that through a wholly-owned subsidiary, the Warrior River Coke Co., it had consummated an option on 60 by-product coke ovens located at Holt, about 60 miles west of Birmingham.

The ovens, last operated by the Central Iron & Coal Co. in 1932, were bought recently by the Associated Metals & Minerals Co. at a sale of properties at Holt. The DeBardeleben Coal Corp. said that "plans for the rehabilitation of these ovens now being worked out will insure their operation in from three to four months." Forty of the furnaces, of 10-ton capacity, were built in 1902. The remaining 20, of 12-ton capacity, were built in 1912.

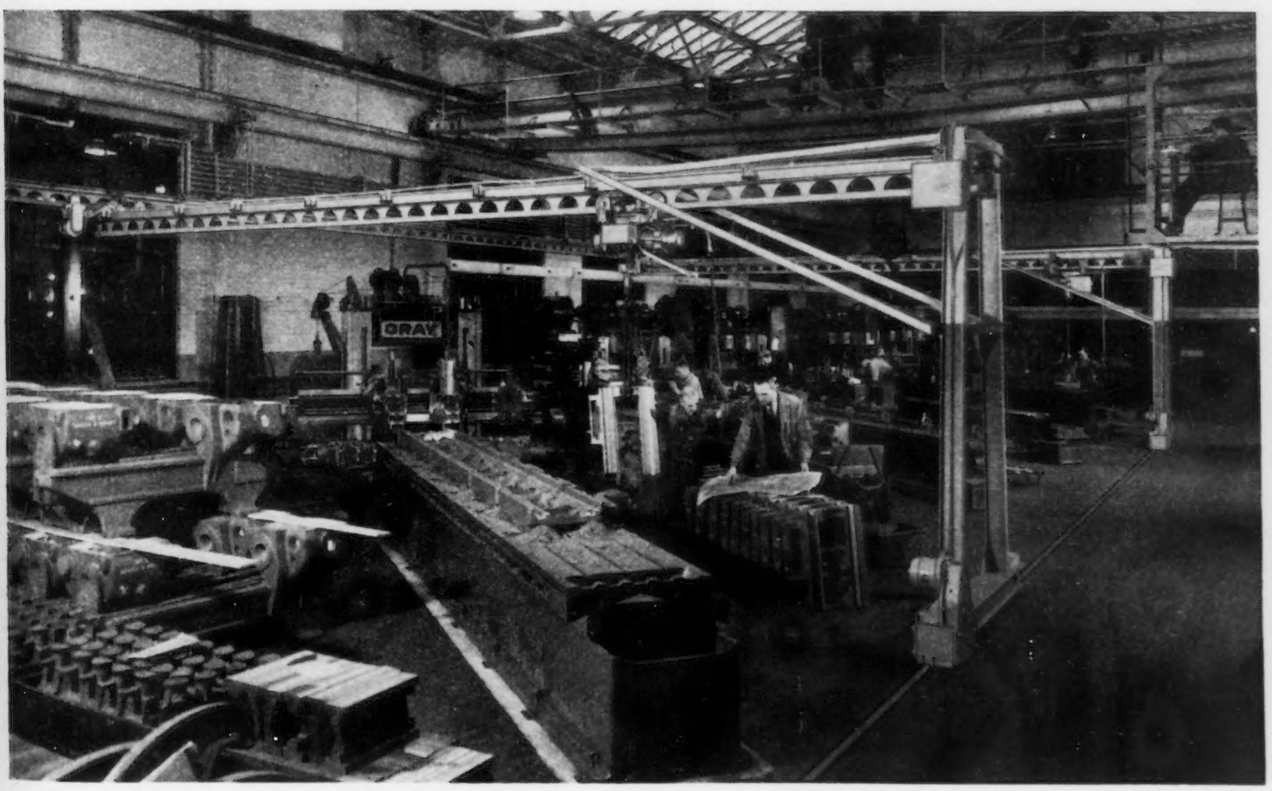
Britain Supplies Own Charcoal Needs

Washington

• • • **Radical improvements in** the technique of charcoal burning, one of Britain's oldest industries, have made it possible to dispense entirely with imports, according to reports from authoritative British sources, says the Metals and Minerals Division, Department of Commerce.

Domestic production of this item, it is said, has been more than doubled by the use of a new type of steel kiln which can be moved from place to place wherever suitable wood is available, and can be worked by unskilled labor under skilled supervision. In the pre-war period more than half the charcoal requirements of Great Britain were imported, chiefly from such remote sources of supply as the Gold Coast of Africa, the Philippine Islands and India.

WARNER & SWASEY modernizes materials handling to increase production for defense program. This photo shows the new long bed planer installation at the Warner & Swasey plant in Cleveland. Twenty-foot planers require much extra crane service. The work is placed on the planer beds in gangs, and this multiple loading and unloading is speeded by Cleveland tramrail motor driven gantry cranes.



Government Awards

Government orders awarded during the week ended January 11, according to the Division of Public Contracts, Department of Labor, follow:

Iron and Steel Products:

S. G. Adams Company, St. Louis; dippers $18,900
Allegheny Ludlum Steel Corp., Brackenridge, Pa.; steel 26,756
American Bridge Co., Inc., New York; steel plates and structural steel 39,008
American Chain Div. of Amer. Chain & Cable Co., Inc., York, Pa.; plate and chain assys. ... 11,500
Astrup Co., Cleveland; tent slips 19,087
Austin Hastings Co., Cambridge, Mass.; steel tubing 31,031
Bellaire Enamel Co., Bellaire, Ohio; pans 12,320
Bethlehem Steel Co., Bethlehem, Pa.; forgings 7,275,484
Bethlehem Steel Co., Bethlehem, Pa.; gate guides 19,480
Bethlehem Steel Export Corp., New York; steel plates 69,045
Blaw-Knox Div. of Blaw Knox Co., Pittsburgh; culvert forms 12,675
Wm. R. Bootz, Successor to Crescent Stove Works, Evansville, Ind.; fire units 226,200
Breeze Corp., Inc., Newark, N. J.; armor plates 18,673
Chas. D. Briddell, Inc., Crisfield, Md.; cleavers 11,707
Bridesburg Engin. Co., Philadelphia; tools 29,546
Carpenter Steel Co., Reading, Pa.; steel 14,330
Ceco Steel Products Corp., Jersey City, N. J.; steel 37,762
Champion Rivet Co., Cleveland; rivets 16,090
Chapman Valve Mfg. Co., Indian Orchard, Mass.; valves 22,000
John Chatillon & Sons, New York; cleavers, saws 30,896
Cleaver-Brooks Co., Milwaukee; boilers 16,400
Clyde Cutlery Co., Clyde, Ohio; knives 32,815
Columbia Steel Co., San Francisco; steel castings 13,125
Comstock-Castle Stove Co., Quincy, Ill.; ranges 22,880
Continental Can Co., Inc., New York and Jersey City, N. J.; gas mask com. 155,991
Copperweld Steel Co., Warren, Ohio; steel 277,172
Crane Co., Seattle; valves 19,835
Crosley Corp., Cincinnati; cabinets, fire 765,885
Cuyahoga Spring Co., Cleveland; wire slips 12,800
Darby Prod. of Steel Plate Corp., Kansas City, Kan.; closure works 10,688
Dover Stamping & Mfg. Co., Cambridge, Mass.; pans, dippers 15,682
Enterprise Foundry Co., San Francisco; weights 28,024
A. B. Farquhar Co., Ltd., York, Pa.; boilers 10,848
G. & J. Mfg. Co., Dallas, Texas; cabinets 299,750
Geuder, Paeschke & Frey Co., Milwaukee; pans 25,520
Globe Machine & Stamping Co., Cleveland; trays 29,500
John H. Graham & Co., Inc., New York; hacksaw blades 32,536
Grigoleit Co., Decatur, Ill.; ammunition components 23,372
Griswold Mfg. Co., Erie, Pa.; meat choppers 17,120
Inland Steel Co., Chicago; sheet steel 18,960
International-Stacey Corp., Columbus, Ohio; weights 30,014
Edward Katzinger Co., Chicago; pans, dippers 59,600
Kilby Steel Co., Anniston, Ala.; forging 694,960
Kirk & Blum Mfg. Co., Cincinnati; cases 35,700
Knox Stove Works, Knoxville, Tenn.; griddles 33,800
Lakeside Bridge & Steel Co., Milwaukee; spillway gates 94,213
Lalance & Grosjean Mfg. Co., Washington; ladles 33,840
Lamson & Goodnow Mfg. Co., Shelburne Falls, Mass.; forks, knives 13,900
Legion Utensils Corp., Long Island City, N. Y.; pans, pots, etc. 17,304
Lockwood Mfg. Co., Cincinnati; pans 28,875
Louisville Tin & Stove Co., Louisville, Ky.; dippers 24,000
Louisville Tin & Stove Co., Inc., Louisville, Ky.; stove pipe 19,455
Louisville Tin & Stove Co., Louisville, Ky.; boxes 17,425
Lynchburg Foundry Co., Lynchburg, Va.; cast iron pipe 33,501
Marshall Stove Co., Lewisburg, Tenn.; stoves 14,280
Midwest Steel & Iron Works Co., Denver, Colo.; structural steel.. 12,736
National Enameling & Stamping Co., Long Island City, N. Y.; containers 348,590
National Road Joint Mfg. Co., Chicago; cabinets, range 598,700
National Stamping Co., Detroit; angletubes 105,032
Norris Stamping & Mfg. Co., Los Angeles; containers 1,006,205
Oliver Iron & Steel Corp., Pittsburgh, Pa.; bolts 48,206
Phoenix Bridge Co., Phoenixville, Pa.; steel curbing 34,752
Phoenix Mfg. Co., Joliet, Ill.; horse shoes 21,836
Polar Ware Co., Sheboygan, Wis.; ladle, pan, etc. 53,211
G. E. Prentice Mfg. Co., New Britain, Conn.; buckles 21,831
Presto Gas Mfg. Co., Chicago; range equip. 51,273
Reeves Steel & Mfg. Co., Dover, Ohio; cans 84,359
Republic Steel Corp., Culvert Div., Indianapolis, Ind.; iron culverts 10,738
John A. Roebling's Sons Co., Trenton, N. J.; steel wire, rope .. 52,909
Rustless Iron & Steel Corp., Baltimore, Md.; steel 38,632
Joseph T. Ryerson & Son, Inc., Chicago; steel 38,328
F. O. Schoedinger, Columbus, Ohio; pans 21,150
William Scrimgeour, Washington; knives, cooking utensils 202,215
William Scrimgeour, Washington; knives, ladles 647,360
R. F. Sedgley, Inc., Philadelphia; rifle barrel 134,640
Servel, Inc., Evansville, Ind.; fire units 196,100
Standard Forgings Corp., Chicago; ammunition 624,000
Steel & Tube Div., Republic Steel Corp., Cleveland; burster casings 97,542
Stevens Walden, Inc., Worcester, Mass.; blanks 17,217
Swanson Machine Co., Jamestown, N. Y.; containers (steel) 87,320
Taylor Metal Products Co., Mansfield, Ohio; grates 33,660
Taylor-Wharton Iron & Steel Co., Easton, Pa.; gas cylinders 24,430
Truscon Steel Co., Harrisburg, Pa.; steel bldgs. 33,962
Union Parts Mfg. Co., Inc., Brooklyn; projectiles 10,168
United States Steel Export Co., Washington; fabricated struc. steel 617,203
Valley Iron Works, Inc., Yakima, Wash.; frames 10,850
Virginia Bridge Co., Birmingham, Ala.; structural steel 24,860
Welker Mfg. Co., Inc., Cromwell, Conn.; buckles 20,209
W. S. Wilson Corp., New York; wrench set 12,211
Wrought Iron Range Co., St. Louis; ranges 24,750
Youngstown Sheet & Tube Co., Youngstown, Ohio; steel angles 17,946
Youngstown Welding & Engin. Co., Youngstown, Ohio; water boxes 83,107

Other Machinery:

American Tool Works Co., Cincinnati; lathes $19,960
Barco Mfg. Co., Chicago; power hammers 11,840
Bullard Company, Bridgeport, Conn.; lathe 12,249
Caterpillar Tractor Co., Peoria, Ill.; tractors 19,560
Chisholm-Moore Hoist Corp., Tonawanda, N. Y.; hoists 15,473
Thomas A. Edison, Inc., Ediphone Div., W. Orange, N. J.; shaving mach. 12,800
Electric Boat Co. (Electro Dynamic Wks.), Bayonne, N. J.; motor parts 21,259
Firestone Tire & Rubber Co., Akron, Ohio; engine parts 14,525
Jaeger Machine Co., Columbus, Ohio; pumps 29,148
Almon A. Johnson, New York; winches 27,240
Kennedy-Van Saun Mfg. & Eng. Corp., Danville, Pa.; wheel assys. 11,366
Lidgerwood Mfg. Co., Elizabeth, N. J.; winches 35,950
Link-Belt Speeder Corp., Chicago; crane 17,225
Mine Safety Appliances Co., Pittsburgh; oxygen transfer equipment 21,362
Morse Chain Co., Detroit; engine parts 50,559
Northern Commercial Co., Seattle; tractors 14,760
Pratt & Whitney Div., Niles-Bement-Pond Co., West Hartford, Conn.; lathes 23,075
W. E. Shipley Machinery Co., Philadelphia; hole grinder 12,845
W. E. Shipley Machinery Co., Philadelphia; boring machine .. 59,700
Simmons Mach. Tool Corp., Albany, N. Y.; lathes 19,500
Singer Sewing Machine Co., New York; sewing machs. 16,100
Warner & Swasey Co., Cleveland; lathes 23,936
Will Corp., New York; centrifuge 25,671
Willows Mfg. Co., Brooklyn; carrier 13,123

Non-Ferrous Metals and Alloys:

Aluminum Cooking Utensil Co., New York; boiler, colander ... $18,075
Aluminum Cooking Utensil Co., New Kensington, Pa.; range equip. 972,391
Aluminum Co. of America, Washington; aluminum 10,275
Aluminum Co. of America, Washington; aluminum alloy 46,067
Aluminum Goods Mfg. Co., Manitowoc, Wis.; aluminum utensils 368,000
Aluminum Products Co., LaGrange, Ill.; pitchers, pots 538,460
American Metal Co., Ltd., New York; solder 22,426
American Metal Crafts Co., Attleboro, Mass.; insignia 34,496
Chase Brass & Copper Co., Inc., Waterbury, Conn.; tubing 97,800
Federated Metals Div., American Smelting & Refining Co., San Francisco; pig lead 41,800
S. Frochlich Co., New York; cases 10,928
Gardiner Metal Co., Chicago; solder 11,351
International Nickel Co., Inc., New York; nickel 236,731

International Silver Co., Meriden, Conn.; fork, knife, etc. 32,379
International Silver Co., New York; silver-plated ware 127,705
Walter Kidde & Co., Inc., New York; fire extinguishers 255,007
Noland Company, Inc., Columbia, S. C.; pig lead 44,352
North American Smelting Co., Philadelphia; solder 25,893
Rex Products Corp., New Rochelle, N. Y.; insignia 192,432
Union Parts Mfg. Co., Inc., Brooklyn; plunger heads 13,582
R. Wallace & Sons Mfg. Co., Wallingford, Conn.; forks and spoons 28,000
Whitehead Metal Prod. Co., Inc., Philadelphia; nickel-copper-alloy 10,520

Air Corps:

Air Cruisers, Inc., Clifton, N. J.; cylinders $406,330
Aro Equipment Corp., Bryan, Ohio; segregators 48,850
Bell Aircraft Corp., Buffalo, N. Y.; adapter assemblies 249,375
Bendix Aviation Corp., Bendix Parts Div., South Bend, Ind.; maintenance parts 168,266
Biederman Motors Corp., Cincinnati; tractors 31,120
Boyle Manufacturing Co., Los Angeles; drums, steel 27,044
Galion Iron Works & Mfg. Co., Galion, Ohio; road rollers 161,800
Leece-Neville Co., Cleveland, Ohio; generator assemblies 39,700
Mitchell Camera Corp., West Hollywood, Cal.; finder assemblies .. 58,559
Pump Engineering Service Corp., Cleveland, Ohio; assemblies 72,471
Weston Electric Instrument Corp., Newark, N. Y.; thermometer indicators 144,500
Yale & Towne Mfg. Co., Stamford, Conn.; fuel pumps 191,688

Quartermaster Corps:

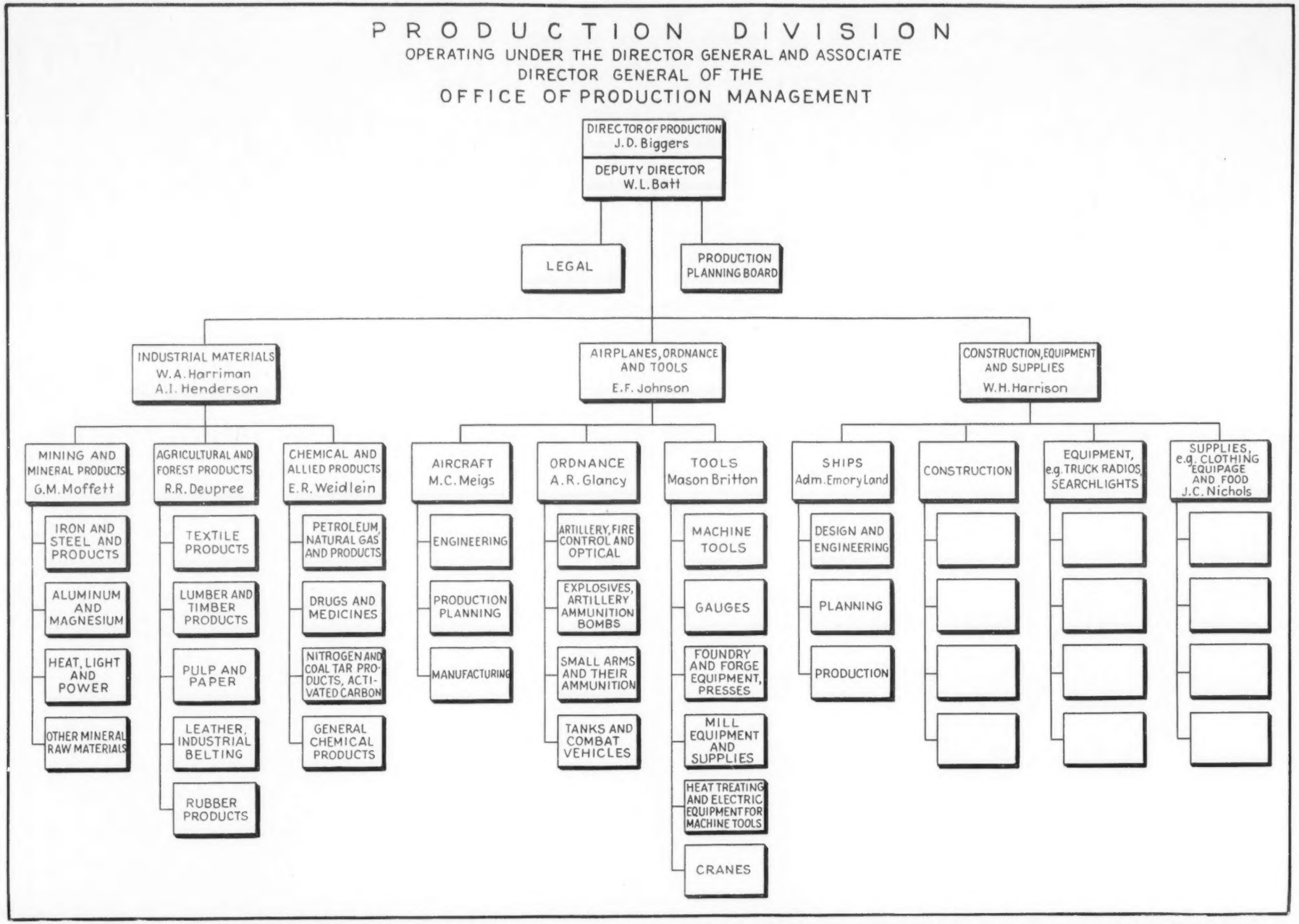
Atlas Tool & Machine Co., Boston; gages $1,900
Barwood & Co., Philadelphia; gages 20,447
Bausch & Lomb Optical Co., Rochester, N. Y.; projector 3,669
Bohn Aluminum & Brass Corp., Detroit; artillery ammunition components 339,300
Colonial Broach Co., Detroit; broach sections 3,393
Conray Products Co., Inc., New York; artillery material 1,458
Charles E. Crofoot Gear Corp., South Easton, Mass.; gears 14,490
Dayton Type, Inc., Dayton, Ohio; machines 10,550
Detroit Broach Co., Inc., Detroit; broach sections 3,013
Ex-Cell-O Corp., Continental Tool Works Div., Detroit; broach sections 1,897
General Motors Corp. (Chev. Div.), Detroit; trucks, ½-ton, 4x2, carryall 266,799
Harley-Davidson Motor Co., Milwaukee; motorcycles, solo 220,410
Indiana Motorcycle Co., Springfield, Mass.; motorcycles, solo.. 219,048
Jones & Lamson Machine Co., Springfield, Vt.; grinding machines 13,863
Lincoln Park Tool & Gage Co., Lincoln Park, Mich.; gages 21,132
Lukens Steel Co., Coatesville, Pa.; steel plate 4,816
McKiernan-Terry Corp., Dover, N. J.; machines, stacking 3,432
Niles-Bement-Pond Co., Pratt & Whitney Div., West Hartford, Conn.; gages 36,135
Otis Elevator Co., Buffalo; castings, steel 10,617
Pipe Machinery Co., Cleveland; gages 23,952
Pratt & Whitney Corp., Hartford, Conn.; lathes 20,676
Somerville Machine & Fdry. Co., Somerville, Mass.; castings, aluminum bronze 3,182
Taft-Pierce Mfg. Co., Woonsocket, R. I.; gages 1,706
Vinco Corp., Detroit; gages 3,689
Warner Electric Brake Mfg. Co., Beloit, Wis.; parts for Warner electric brakes 26,369
White Motor Co., Cleveland; tops, canvas, with curtains for scout cars 3,725
Winchester Repeating Arms Co., New Haven, Conn.; small arms ammunition 2,500

Ordnance Department:

Allis-Chalmers Mfg. Co., Milwaukee; transmission assemblies and spare parts $34,266
American Brake & Shoe Foundry Co.; forgings 4,400
American Brass Corp., Waterbury, Conn.; small arms material ... $1,129
Atwater Mfg. Co., Plantsville, Conn.; plugs, steel 118,125
Auto Ordnance Corp., Bridgeport, Conn.; small arms material ... 8,432
Bendix Aviation Corp., Eclipse Machine Div., Elmira, N. Y.; artillery ammunition 148,824
G. S. Blakeslee & Co., Cicero, Ill.; machines, washing 8,655
Bohn Aluminum and Brass Corp., Detroit; artillery ammunition components 3,190
Breeze Corp., Inc., Waverly Plant, Elizabeth, N. J.; artillery material 18,673
Bridesburg Foundry Co., Philadelphia, Pa.; castings, bronze 7,983
Buffalo Forge Co., Buffalo; heaters 1,067
Canister Co., Phillipsburg, N. J.; artillery ammunition components 418,954
Caterpillar Tractor Co., Peoria, Ill.; tractors 5,385
City Steel Door Corp., New York; accessories, chest 4,200
Cleveland Container Co., Philadelphia; artillery ammunition components 4,250
Frederick Colman & Sons, Inc., Detroit; gages 1,231
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.; small arms material 28,216
Detroit Testing Machine Co., Detroit; machines hardness testing 1,085
Charles Fischer Spring Co., Brooklyn, N. Y.; small arms material 24,185
A. Frochlich Co., Inc., New York; small arms material 10,928
General Bronze Corp., Long Island City, N. Y.; artillery material 102,405
Goddard & Goddard Co., Inc., Detroit; cutters 1,680
Goodman Mfg. Co., Chicago; artillery material 591,500
Greenfield Tap & Die Corp., Greenfield, Mass.; taps, hand 1,232
Honing Equipment Corp., Detroit; honing machines 4,713
Improved Mailing Case Co., Inc., Brooklyn, N. Y.; artillery ammunition components 2,521
Justus Johnson & Son Co., Hartford, Conn.; dies 1,365
John P. Kelly, Philadelphia; castings, manganese bronze 1,194
Kennedy-Van Saun Mfg. & Eng. Corp., Danville, Pa.; wheel assemblies 11,366
Lynd Farquhar Co., Boston; machines, milling 20,860
McGill Manufacturing Co., Valparaiso, Ind.; automotive equipment 1,551
Modern Tool & Die Co., Philadelphia; gages 1,524
National Acme Co., Cleveland, Ohio; machines 1,971,330
National Cash Register Co., Dayton, Ohio; artillery ammunition 174,000
Norton Co., Worcester, Mass.; grinders 1,407
Norwalk Lock Co., South Norwalk, Conn.; artillery ammunition components 2,910,000
Oliver Iron & Steel Corp., Pittsburgh; plugs, steel 118,125
Parker & Harper Mfg. Co., Worcester, Mass.; small arms material 2,509
Poor & Co., Canton Forge & Axle Works, Canton; artillery material 16,870
Porter Forge & Furnace, Inc., Boston; forgings steel 1,140
Republic Steel Corp., Alloy Steel Div., Massillon, Ohio; steel ... 1,361
Riordan Machinery Co., Detroit; machines, milling 31,348
Scovill Mfg. Co., Waterbury Conn.; artillery ammunition components 3,780,000
W. M. Steele Co., Worcester, Mass.; machines 9,450
Thomson-Gibb Electric Welding Co., Lynn, Mass.; press welders 8,460
Triumph Explosives, Inc., Elkton, Md.; automotive equipment ... 12,570
Union Twist Drill Co., Athol, Mass.; mills 1,551
Vinco Tool Co., Detroit; gages .. 3,553
Henry Vogt Machine Co., Louisville, Ky.; machinery 15,290
Winchester Repeating Arms Co., New Haven, Conn.; artillery ammunition components 7,315
York Safe & Lock Co., York; fire control equipment 16,659

Navy Department:

Acme Machine Tool Co., Cincinnati; lathes, universal, brass finishing $23,616
Aerial Machine & Tool Corp., New York; assemblies 40,320
Allis-Chalmers Mfg. Co., Milwaukee; tractors 8,492
Armstrong Bros. Tool Co., Chicago; wrenches 59,875
Atlas Car & Mfg. Co., Atlas Bolt & Screw Co., Props., Cleveland, Ohio; locomotive 22,975
Beacon Devices, N. Tonawanda, N. Y.; pumps 6,924
Bethlehem Steel Co., Bethlehem, Pa.; steel, tool 95,379
Billings & Spencer Co., Hartford, Conn.; wrenches 6,501
Calumet & Hecla Consolidated Copper Co., New York, N. Y.; copper, ingot 48,200
Chambersburg Engineering Co., Chambersburg, Pa.; press, hydraulic 7,250
Crucible Steel Co. of America. New York; steel, tool, carbon .. 383,923
M. T. Davidson Co., Brooklyn, N. Y.; pumps, centrifugal type ... 17,761
Fairmount Tool & Forging Co., Cleveland; wrenches 14,677
Federal Electric Co., Inc., Chicago; horns, electric 5,724
Gardner-Denver Co., Washington, D. C.; compressors 13,912
General Excavator Co., Marion, Ohio; cranes, crawler, gasoline engine driven 251,103
Hardware Supply Corp., New York; wrenches 12,704
Harrisburg Steel Corp., Harrisburg, Pa.; cylinders, compressed gas 41,717
Hooven, Owens, Rentschler Co., Hamilton, Ohio; jacket, lower cylinder 7,163
Indestro Mfg. Corp., Chicago; wrenches 11,914
Ingersoll-Rand Co., Washington; compressors 29,088
Jack & Heintz, Inc., Cleveland; starters 15,000
Kay Mfg. Corp., Brooklyn; bottoms, wire; spring helical 8,315
Lake Superior Shipbuilding, Superior, Wis.; oil barges 2,184,448
Mill Factor Products Co., New York; reamers, carbon-steel 11,236



NEW DEFENSE LINEUP: This chart (as of Jan. 23, 1941) shows how the raw materials and production divisions of the National Defense Advisory Commission are being reorganized under John D. Biggers. The new Production Division will be a "trouble shooter," will include a production planning board. will intensify efforts to spread defense contracts more widely, will determine the need of organizing industrial advisory committees. Sub-contracting and utilization of idle industrial equipment will be studied. Deputy director is W. L. Batt.

Ohio Faces 1941 Labor Shortage

Cleveland

• • • **Ohio's supply of** skilled and semi-skilled labor, none too ample, will be sorely taxed before the end of 1941, according to present indications.

A survey of 15 leading plants in the Greater Cleveland area by THE IRON AGE on Jan. 15 shows that a minimum of 11,150 men will be required during 1941. On this basis, employment experts say it is reasonable to assume the balance of the 2000 firms in the Cleveland area might require at least an additional 11,000 workers during 1941, since a number of large employers are only operating one shift at present. The estimated 22,000 jobs would represent an increase of approximately 13 per cent over the present level of 160,000 persons employed by the 2000 concerns. Current employment at Cleveland is now approximately at the peak level of 1929.

The ability of Cleveland firms to employ more men is still well below capacity.

Principal types of defense program work which will boost employment at Cleveland are aircraft parts production, ordnance work, machine tool output and diversified direct and sub contracts.

In the Akron-Ravenna area labor requirements of approximately 6750 persons are likely to arise because of the new ammunition loading plant at Ravenna and the amount of defense program work in Akron plants. Production of naval ordnance and army contracts in the Canton-Massillon vicinity will necessitate employment of at least 3400 persons. At Toledo where numerous contracts are held for tank parts and shell production, around 7500 persons will be required. At Columbus, aircraft assembly and heavy fabricating will provide jobs for 12,900 persons. Requirements in the Dayton-Springfield area are estimated at 2730, arising principally from ordnance work, aircraft parts, trucks and machine tools. In the Elyria-Lorain district various direct and sub contracts will require an additional 1080 persons. The new TNT plant and other defense contracts in the Sandusky-Huron vicinity will mean 5700 additional jobs.

At Youngstown, production of ammunition and steel and various types of fabricating will probably require around an additional 1200 persons. Returns from the Cincinnati area are incomplete, but it is estimated that at least 11,000 jobs will be open, possibly arising from production of aircraft engines and machine tools. Smaller requirements include 400 at Marion, 200 in the Conneaut-Ashtabula vicinity, 200 at Warren and approximately 500 persons in other areas including Urbana and Bryan.

In all the above estimates, construction workers and shipbuilding possibilities have not been included.

All-time records were set by many employment bureaus in Ohio during the last quarter of 1940. Employment at Cleveland showed a 31 per cent gain. Equally roseate records were established in other parts of the state.

At Columbus as a result of new businesses and expansions in 1940, employment was increased by approximately 4000 persons. In the Springfield-Dayton area operations of one farm implement and truck company alone are reported to have added approximately 600 men in November. At Hamilton an assembly plant of a motor car manufacturer stepped up its employment from 590 persons to 738 in the space of 30 days in November and December. At Troy, Waco Aircraft has been planning to recall 600 men and resume production. One Cleveland company which is operating 24 hours per day on defense business and has built up its force from 500 to 1300 persons in the past year is now employing 200 more than the company believed it possible to accommodate in the shop.

In late December 1500 employers of twenty or more persons in Ohio reported they would need 6600 persons in 60 days, approximately half of the 6600 being skilled workers. In a number of instances, according to THE IRON AGE survey, temporary inability to obtain skilled workers readily has delayed hiring of semi-skilled and other classes of labor. Until skilled operators are found, it is impossible to add the others.

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Chicago Government Orders $308 Millions

Chicago

• • • Army and Navy contracts amounting to $308,528,040 were awarded to Illinois manufacturers during the period of July 1 to Dec. 31, 1940, according to a compilation by the Illinois Manufacturers' Association based on data supplied by the Office of Government Reports.

During the last two weeks of December, these contracts amounted to $13,175,051 and included such articles as artillery material, trucks, gloves, clothing, surgical dressings, paint and food.

Mesaba Ore Shipments 44,829,988 Tons in 1940

Cleveland

• • • **Lake shipments** from the Mesaba Range which totaled 44,829,988 gross tons in the 1940 season consisted of 33,341,379 tons of non-bessemer ore, 11,330,636 tons of bessemer and 157,973 tons of manganiferous ore, according to a breakdown made by the Lake Superior Iron Ore Association here.

The Gogebic Range shipped 5,908,538 gross tons, including 4,759,597 tons of non-bessemer and 948,672 tons of bessemer plus 200,269 tons of manganiferous.

The Marquette Range shipped 5,690,288 gross tons, including 5,153,888 tons of non-bessemer and 45,628 tons of bessemer and 490,772 tons of siliceous ore. The Vermilion Range shipped 1,452,303 gross tons broken down into 892,058 tons of non-bessemer and 560,245 tons of bessemer. The Cuyuna Range shipped 1,707,908 tons, of which 1,439,100 tons was manganiferous ore.

Out of 3,130,284 tons shipped from the Menominee Range, nonbessemer totaled 3,043,319 tons and the balance was siliceous ore. The Michipicoten Range in Canada shipped 356,613 tons of bessemer ore.

Grand total of shipments from United States ranges was 63,075,922 tons, of which 47,428,154 tons were non-bessemer, while 12,885,181 were bessemer, 1,797,342 manganiferous and 608,632 tons siliceous.

Heavier Bessemer Output Is Forecast

• • • **Possibility of increasing** the nation's steel production as an aid to defense without actually constructing additional steel producing units was indicated today in an announcement by the Jones & Laughlin Steel Corp. that it has licensed three other large steel companies to use its patented Bessemer Flame Control method of manufacturing steel.

License agreements have been made with Republic Steel Corp., Youngstown Sheet & Tube Co., and Wheeling Steel Corp., and to equip their bessemer converters with the photo-electric cells and recording devices necessary to determine automatically the important "end-point" or termination of the "blow," which has a definite influence toward uniformity in quality of the steel. Much of this equipment has already been installed and is in operation. Other steel companies are likewise negotiating for licenses.

In addition, the Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., has been licensed. All future agreements with steel foundries will be made by the Whiting Corp., Chicago, which has been authorized to negotiate such licenses.

In connection with the announcement of the license agreements, H. W. Graham, director of metallurgy and research for J & L, said, "It is admitted by steel experts that the present officially rated capacity of open hearth steel production is quite accurate, but that the published capacity for the bessemer process has, over a period of years, been revised downward until the rated output of existing bessemer facilities is believed to be much below the tonnage that could actually be produced under the pressure of any great demand."

Pointing out that bessemer and open hearth steel are not interchangeable without restriction, Mr. Graham said, "It is not intended to convey that more bessemer steel could be produced to directly supply such needs as aircraft production; yet the fact that existing converters could produce more bessemer steel, to replace open hearth steel for many uses, may prove to be a fact of great importance if the national need for steel should become acute." Metallurgists are generally of the opinion that adjustments could be made in manufacturing operations to advantageously use a greater portion of bessemer steel, he said.

"If the Bessemer converters in the United States were operated at their fullest rate of production," Mr. Graham continued, "it might be found that existing coke and iron making facilities would have to be enlarged; but in any event the required investment cost would presumably be less than involved in an equivalent increase in ingot production by the open hearth method."

Mr. Graham further pointed out the advisability of more complete utilization of the bessemer process, which produces more scrap than it consumes, to keep the scrap and pig iron requirements of the industry in balance. He said, "There is today a full and active demand for scrap for steel making and any considerable increase in open hearth capacity would bring the industry perilously close to an acute scrap shortage." That a scrap shortage already exists is indicated, he said.

Tool Builders' Association Plans New Publication

Cleveland

• • • **The first issue** of a new publication by the National Machine Tool Builders' Association, with headquarters here, is expected to appear soon. It will be an 8-page magazine entitled *"Machine Tools"* and will contain photographs and write-ups of the role being played by machine tools in the national defense program. The venture is aimed primarily at laymen.

200 New Cargo Ships Sought by President

Washington

• • • **President Roosevelt** last week asked Congress to authorize immediate construction of 200 cargo ships as the Maritime Commission established a division of emergency ship construction to plan for the construction of new shipbuilding plants, the expansion of existing yards, and the designs for hull and engine construction under the emergency program.

Coke Supply Ample, OPM Survey Finds

Washington

• • • **J. D. Biggers,** production director of the Office of Production Management, reports that a recent National Defense Advisory Commission survey of the steel industry shows that all companies are more than adequately supplied with full requirements of coke even at present capacity operations.

Indications are, he said, that this satisfactory condition will be maintained, that further plans for considerable additional by-product coke capacity are under consideration, and that all factors point to an eventual supply to meet all requirements of the steel industry operating at full capacity.

"Most steel companies are producing sufficient coke to meet their own requirements," Mr. Biggers reported. "Other companies are buying by-products and beehive coke, and, in some cases, importing coke from England to meet present requirements.

He characterized as "general" a condition which finds some excess stocks available at eastern foundries for emergency cases, and added that while no shortage of household coke is known to exist, the demand will decrease considerably after the next few months, after which the supply now going into household use will be available for industrial purposes.

The new director of production estimated that new coke capacity for approximately 3,000,000 tons will be in production by the end of the current year.

"Further plans for considerable additional by-product coke capacity are known to be under consideration," Mr. Biggers said.

Rust Engineering to Build Canton Ordnance Plant

Pittsburgh

• • • **Rust Engineering Co.** has been awarded the general contract for the construction of major buildings of a new $16,500,000 Navy ordnance plant at Canton, Ohio, according to Westinghouse Electric & Mfg. Co., which is building and operating the plant for the government.

Scrap Rail Sharing Studied at Capitol

Washington

Equitable distribution of scrap rails between foundrymen and rerollers was discussed at a conference here Tuesday which W. W. Rose, Cleveland, secretary of the Gray Iron Founders Society and Oliver Smalley, president of the Meehanite Institute, held with C. A. Bishop, executive assistant to Leon Henderson, head of the Price Stabilization Division of the National Defense Advisory Commission.

Mr. Bishop said he was confident that a plan would be worked out so that both the foundrymen and rerollers would get their fair share of tonnages. He dismissed as entirely unwarranted reports that any effort had been made to have all scrap rails diverted to rerollers.

"We are trying to get certain rails to rerollers so they won't have to go out of business," said Mr. Bishop, "and it looks as though there will be enough for both them and foundrymen. There is nothing for either group to worry about."

Mr. Bishop said that railroads, rerollers and foundrymen have been requested to make a careful check of the situation, the railroads to give the tonnage of used rails sold and foundrymen and rerollers the tonnages they have bought.

Acting under the arrangement Mr. Rose said that he would send out a call on Wednesday to each gray iron foundry to get its rail purchases in 1940, and then find out the tonnage sold and the quantities used by rerollers. Malleable and steel foundries will be requested by Mr. Rose to supply similar data.

Mr. Bishop denied reports that the Price Stabilization Division has ordered railroads to sell scrap rails at any price. He stated that the only action the division has taken was its recent request that the price of No. 1 heavy melting steel be reduced to $20 a ton Pittsburgh as soon as possible. He said it is also proposed that the scrap rail price be reduced to $21.

Federal Shipbuilding To Expand Shipways

• • • **The Federal Shipbuilding &** Dry Dock Co. of Kearny, N. J., United States Steel Corp. subsidiary, is proceeding with arrangements to acquire 15¼ acres of land which adjoin its property at Kearny for additional shipways, an outfitting basin, together with certain other miscellaneous crane equipment and service buildings to provide the facilities necessary to construct its share of the national defense shipbuilding program.

Federal Shipbuilding has on hand orders for the building of 42 naval and 10 merchant vessels. Fifteen ships were completed last year and more than 10,000 men are presently employed at the Kearny Yards. A large part of the force is working in three shift operations.

Lukens Steel Co. to Enlarge Wide Plate Mill

Washington

• • • **The Navy Department** has made a contract with the Lukens Steel Co., Coatesville, Pa., for the acquisition, construction, and installation of additional plant facilities, including building extensions and additions and associated mechanical equipment and machinery for increasing the productive capacity of the company's 206-in. plate mill. The total estimated cost is $2,160,000.

When the Lukens company installed its large mill the soaking pits were not made deep enough to take the largest size ingots. These soaking pits will be deepened and new ones will be built. There will also be additional crane capacity. A part of the output of the Lukens mill will be used for Scotch boilers and other Navy and merchant ship work. Improvements will be completed about July 1.

National Automobile Show Is Canceled

• • • **The Automobile** Manufacturers Association has canceled the National Automobile Show which normally would have been held in New York City in October.

Murray Stops Strike At C-I's Irvin Plant

Pittsburgh

• • • **Intervention of** Philip Murray, CIO president and head of the SWOC, early this week caused the return to work of 200 workmen who had gone on strike at Carnegie-Illinois Steel Corp.'s Irvin works. Pickets had formed late last week following an outlaw strike over the charge that the company had failed to expedite the settlement of grievances. The workmen, involved in chipping and scarfing operations at the slab yard, had jeopardized the jobs of 4000 other employees, many of whom were working on national defense projects.

Murray ordered the men back to work, saying that whatever grievances come up should be referred to the national office. "I want no misgivings on my advice tonight. It would be unfortunate, even disastrous, if we lend comfort to a situation which might bring idleness while there still is time to correct it."

U. S. Steel Meets SWOC On Wages, Union Shop

Pittsburgh

• • • **The broad question** of wages, union shop, checkoff, and the expediting of grievance settlements were informally discussed early this week here by Philip Murray, CIO president and SWOC head, and William Beye, vice-president, U. S. Steel Corp. of Delaware. Neither side had any comment following the close of the meeting. Murray and Beye will convene again on Jan. 31 to explore further discussions initiated at the first meeting.

Machine Tool Activity Reported at 96.8%

Cleveland

• • • **December operating** activity of the machine tool industry, measured in terms of payroll hours, was 96.8 per cent of the capacity reported, according to National Machine Tool Builders Association here. Capacity increased 4 per cent over November, bringing the accumulated increase to 61.2 per cent over September, 1939.

• **William E. Schaefer,** formerly in charge of airplane production Ford Motor Co. airplane division from 1924 to 1928, and later with the Metal Aircraft Corp., Cincinnati, and the Glenn L. Martin Co., has been appointed general superintendent in charge of manufacturing operations for Republic Aviation Corp.

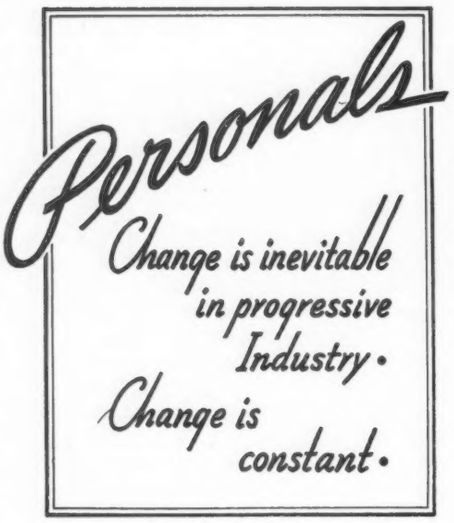
• **Otto Kessler,** a chemical engineer, for many years with General Chemical Co., has become associated with the enlarged chemical division of the Foote Mineral Co., Philadelphia. He will devote most of his time to production problems.

• **Frederick G. Palliaer** has been chosen by newly inducted Governor Murray G. Van Wagoner of Michigan as State Commissioner of Labor and Industry. Mr. Palliaer has been deputy commissioner of the department for 10 years with the exception of an interlude of one year. Other members of the commission of labor and industry are **John Gibson, Harold E. Bledsoe** and **Joseph Rubin** of Detroit, and **David M. Martin** of Flint.

• **Dr. George W. Taylor,** associate professor in industry at the University of Pennsylvania, has been named permanent umpire for General Motors Corp. and the UAW-CIO. He succeeds **Harry A. Millis,** who resigned to take chairmanship of the National Labor Relations Board.

• **George B. Kutz** has been appointed district sales manager for the southeastern territory of Wright manufacturing division of American Chain & Cable Co., Inc., York, Pa. Mr. Kutz has been associated with American Chain & Cable Co. for many years. For several years he was district sales manager at Chicago for the American Chain division, but more recently he has been located at York, Pa. It is expected that he will make his headquarters in Atlanta.

• **William H. Dernell,** associated for 20 years with the Ault & Wiborg Corp., has been named district manager in Southern California with offices in Los Angeles. Mr. Dernell joined Ault & Wiborg as an industrial engineer, later becoming manager of the Cincinnati plant. For a number of years he has handled sales activities, more recently having been manager of the Buffalo district.



• **William T. Streicher,** heretofore sales engineer in the Kansas City office of Bunting Brass & Bronze Co., Toledo, has been transferred to the Chicago area. He is being succeeded in Kansas City by **John J. Mengler. Robert J. Bergum,** a former salesman, has rejoined the company in Minneapolis, and **William Dorsey** will represent the company in Seattle. **William A. Schneider** has been transferred to the Dallas area to take the place of **James F. Roberts,** who has gone to Indianapolis.

• **A. B. Donkersley** has been elected president of the Industrial Unit Heater Association, Detroit, succeeding **C. C. Cheyney,** who has become vice-president.

• **Paul B. Hoffman** has been named general sales manager of the American Brakeblok Co., Detroit.

• **Rudolph F. Gagg,** formerly assistant chief engineer of Wright Aeronautical Corp., construction supervisor for the company's expansion program and more recently loaned to the government to direct construction of its Aeronautical Engine Laboratory at Cleveland, has been appointed assistant to the general manager of the Wright corporation to work on special projects. Mr. Gagg is a graduate both of the University of Colorado and Yale University. He joined the company in 1930 as an experimental engineer.

• **Don J. Kirk,** heretofore district representative in Detroit for the Greer Steel Co., Dover, Ohio, has been promoted to the position of assistant sales manager. with headquarters at Dover.

• **Arthur S. Hoff,** since 1933 identified with the shape, plate and piling division of the sales department of Inland Steel Co., Chicago, has been appointed assistant manager of sales of plates, shapes and sheet piling. Prior to his association with Inland, he was with the Chicago office of Jones & Laughlin Steel Corp. and with the American Bridge Co. He attended the University of Illinois and was graduated from the University of Mississippi in 1925.

• **J. L. Brown,** since 1928 construction manager for United Engineers & Constructors, Inc., Philadelphia, has been elected a vice-president of the company.

• **B. B. Williams,** former president of the Cooper-Bessemer Corp., Mt. Vernon, Ohio, has been made chairman of the board, succeeding **E. J. Fithian,** who has resigned. **Charles B. Jahnke** has been made president, as announced in these columns two weeks ago.

• **George H. Kenyon,** who joined the American-Marietta Co., Chicago, a year ago, has been appointed manager of the company's metal finishes department. After his graduation from McGill University, he was employed as sales engineer by the Link Belt Co. for a number of years before entering the industrial finishes field in 1933.

• **F. W. McIntyre,** vice-president and general manager of the Reed-Prentice Corp., Worcester, Mass., was scheduled to report to Washington on Jan. 20 to work with **Howard W. Dunbar,** vice-president of the Norton Co., on work for the Council of National Defense, Machine Tool Coordinating Committee.

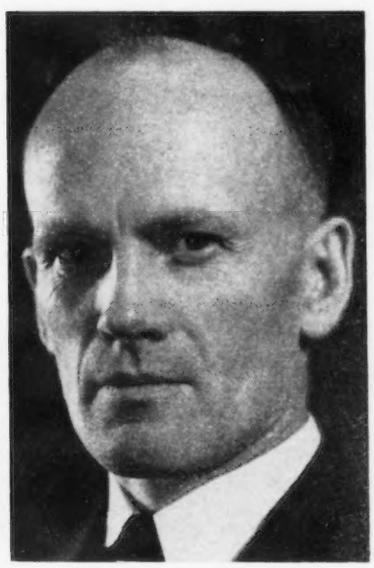
• **M. P. Robinson,** proprietor of the Robinson Filter Co., has joined the Worthington Pump & Machinery Corp., Harrison, N. J., to take charge of the company's newly organized water purification equipment division.

• **E. S. Chapman,** vice-president and assistant general manager of the Plymouth Division of Chrysler Corp. for the past five years, has been loaned at the request of the National Defense Advisory Commission to serve on its staff, effective Jan. 20. He will make his headquarters in Washington and will assist in organizing and di-

Harold A. Hallstein, vice-president and assistant general manager of Austin Co., Cleveland.

recting industrial efforts in the defense program.

Chapman's first association with the Chrysler Corp. was on the staff of K. T. Keller, who was then vice-president in charge of production and president of the Dodge Division. He served from 1928 until 1935 in executive positions in Chrysler including staff master mechanic, operating manager of the Newcastle plant, and operating manager of the Amplex Division. He went to Chrysler from the Gisholt Machine Co., Madison, Wis., with which he had served from 1916, when he started as an apprentice machinist, until 1928 when he joined Chrysler. Born in Chicago in 1895, he was educated at the University of Wisconsin.



A. N. Swanson, chief metallurgist, Gary works, Carnegie - Illinois Steel Corp.

• **Harold A. Hallstein,** vice-president of the Austin Co., Cleveland, since 1934, will also serve as assistant general manager. **Allan S. Austin,** son of the late Wilbert J. Austin, who was president of the company until his death Dec. 4, has been named secretary. **George W. Plaisted,** vice-president and general sales manager of the company, who entered the Austin organization in 1916, has been elected a director, filling the vacancy created by Mr. Austin's death.

• **A. N. Swanson** has been appointed chief metallurgist of Gary works of Carnegie - Illinois Steel Corp. Mr. Swanson was first employed at Gary works in 1922 in the metallurgical department where he served in various capacities until 1934 when he became assistant chief metallurgist. He was appointed assistant to division superintendent of the west mills in 1940, the position he held until receiving his new post.

• **Henry F. Millmann,** executive vice-president and general manager was feted by officials and employees of the Geuder, Paeschke & Frey Co., Milwaukee, on the occasion of his having served 50 years with the firm. At a dinner in his honor held at the Wisconsin club, **Frank Frey,** president of the company, presented Mr. Millmann with a gold watch. Mr. Millmann quit his job with J. P. Lindemann & Sons in 1891 to join Geuder, Paeschke and worked his way through factory production, purchasing and management until he was appointed to his present job two years ago.

• **F. E. Fairman, Jr.,** who joined General Electric Co. in 1923 at the Baltimore works as a switchgear engineer, has been appointed assistant manager of the switchgear division, central station department, Philadelphia. He was transferred to the Pittsburgh office as a switchgear specialist in 1927, three years later becoming an industrial salesman handling steel mills. He returned to the switchgear division at Philadelphia in 1933, becoming sales manager of the equipment section in 1939. He is being succeeded as sales manager of the equipment section in the switchgear division by **J. D. Hoffman,** who has been identified with General Electric since his graduation from Stevens Institute in 1917, except for two years in military service in the World War and a short period when he was in business for himself.

Allan S. Austin, secretary, the Austin Co., Cleveland.

Henry F. Millmann, executive vice-president and general manager of Geuder, Paeschke & Frey Co., Milwaukee, celebrates 50 years of service.

• **L. E. Smith,** formerly superintendent of masonry for the Continental Steel Corp., Kokomo, Ind., has been appointed chief engineer of the company's Kokomo plant, succeeding **L. H. Mandeville,** who has resigned. Mr. Smith, who was graduated from Purdue University in 1925, has been identified with the company for the past six years.

• **Dr. Edward E. Minor, Jr.,** research and development engineer of the Glenn L. Martin Co., Baltimore, has been appointed chairman of the new air transportation committee of the American Institute of Electrical Engineers.

• **J. H. Sprenger** has been made Southern sales representative for the process equipment division of the H. K. Porter Co., Inc., Pittsburgh. He will make his headquarters in Memphis, Tenn.

• **Grant B. Shipley,** chairman and director of the Wood Preserving Co., Pittsburgh, has sold his interests in the company to the Koppers Co., Pittsburgh.

• **Harry J. Schultz,** formerly manager of the contractors division of the Independent Pneumatic Tool Co., has been appointed central regional manager of the construction equipment division of Worthington Pump & Machinery Corp. He will make his headquarters at Worthington's Chicago office in the Daily News Building.

• **W. Homer Hartz,** president of the Morden Frog & Crossing Works, who had served two years as president of the Illinois Manufacturers' Association, was made chairman of the advisory board at a meeting of the board of directors.

• **A. F. Gill** of Ottawa, has been appointed assistant director-general of the munitions branch of the Department of Munitions and Supply. Previous to taking up his duties with the Department of Munitions and Supply, Mr. Gill served for six years as head of the Codes and Specifications Section of the National Research Council. In 1939 he went to England with the Canadian Manufacturers' Association mission on rearmament, as technical assistant to Major General A. G. L. McNaughton, at that time president of the National Research Council and now officer commanding the Canadian Corps in England.

Obituary

• **Herbert V. Tossy,** former supervisor of materials for the Fisher Body division of General Motors Corp., died recently at his home in Riverside, Ont., where he had lived for 11 years, aged 58 years. He retired from Fisher Body five years ago after 23 years with the organization.

• **James H. Larsen,** shop superintendent for the Allis-Chalmers Mfg. Co., Milwaukee, and an employee of the company since 1897, died Dec. 23 at his home in Milwaukee.

• **John C. Luland,** specialist in alloy tool steel and formerly with Crucible Steel Co. of America, died Dec. 23 at his home in Newark, aged 87 years. Mr. Luland pioneered in demonstrating proper methods of heat treatment and the advantages of modern high speed steels.

• **Alfred C. Getz,** vice-president and founder of the Sidney Machine Tool Co., died at his home in Sidney, Ohio, Jan. 9, aged 72 years. Mr. Getz founded the Sidney Machine Tool Co. in 1904 and acted in the capacity of secretary and general manager until 1937 when he retired from active service. In 1909 Mr. Getz was instrumental in bringing to Sidney the A. P. Wagner Co. from Detroit, which was the beginning of the Monarch Machine Tool Co. He managed this company in its earlier days in addition to directing the operation of the Sidney Machine Tool Co.

• **George W. Jones,** president, Hancock Mfg. Co., New Cumberland, W. Va., and formerly vice-president of the Geometric Stamping Co. at Cleveland, died Jan. 14 in Miami Beach, Fla., where he was spending the winter. He was associated with the Geometric Stamping Co. from the time of its founding until he left Cleveland in 1933. He was 57 years old.

• **Frank E. Bardrof,** sales manager of Cleveland Worm Gear Co. from 1925 until 1932 and later an associate of the T. H. Ball Advertising Co. in Cleveland, died Jan. 15 at his home, aged 51 years.

• **J. W. Hernlund,** in charge of the installation of machinery and equipment in the new plant of Briggs Mfg. Co., at Cleveland, died Jan. 15 following a heart attack. Born in Minneapolis 50 years ago, his career included service with the Castings Patent Corp. and Western Electric Co.

• **John P. Dowd,** chief engineer, Industrial Brownhoist Corp., Cleveland, until his retirement seven years ago, died Jan. 15 aged 71 years. He was at one time assistant sales manager of the company with which he was connected for 35 years.

• **Winfield H. Smith,** president of Winfield H. Smith, Inc., Springville, N. Y., died Jan. 14 in the Buffalo General Hospital after a short illness. Born in Rhode Island 80 years ago, he first started in the hardware business with his father. He joined the Lake Erie Engineering Co. in 1893 but left in 1901 to form Essex & Smith, Inc., engine manufacturers. This partnership continued until the death of Mr. Essex, his brother-in-law.

• **Frederick G. Johnston,** brass products manufacturer, Detroit, died recently. Mr. Johnston, who was 80 years old and a life-long resident of Detroit, had operated his own factory until a short time ago when he became ill. He operated the F. G. Johnston Co.

• **Frank H. Payne,** secretary-treasurer of Wickes Brothers and Wickes Boiler Co., Saginaw, Mich., for 45 years, died recently, aged 76 years.

• **George Murray Brooks,** executive vice-president and general counsel for the Okonite Co., died at the Columbia Presbyterian Medical Center after several weeks' illness. Shortly after his graduation from Yale University in 1879, he became connected with the Okonite Co. and at the time of his death had served for many years on its board of directors. He was also a director and vice-president of the Okonite-Callender Cable Co., Inc.

• **Gordon J. Ratzoe,** assistant purchasing agent of National Screw & Mfg. Co., Cleveland, died Jan. 7 after several months' illness, aged 38 years.

• **J. Bert Shull,** chief clerk of accountants for Republic Steel Corp., died Jan. 6 at Lakeside Hospital, Cleveland. He was 58 years old.

Does Steel Industry Need New Capacity?

(CONCLUDED FROM PAGE 31)

ture, on page 22. Farm income shows an upward trend, whereas steel consumption by agriculture drops off—one explanation being that farm equipment is progressively improved in design and construction, and therefore less steel is required; another reason being that export markets for agricultural equipment are practically nil today.

The treatment of automotive, on page 22, is possibly open to some criticism. The 1942 output is arbitrarily scaled down to 4,000,000 units, which could possibly be excessively severe. However, if the industry wants higher production, steel will be available.

Then, consider Construction on page 24. Increases in consumption of steel in no way increases apace with increases in dollar volume of construction. The reason is that stronger steels, expanded metal construction, etc., reduce steel tonnage going into buildings.

Next, examine Light Containers on page 24. Here the trend in can output is steadily upward, whereas steel consumption trends down. The reason is that can makers are adopting lighter gage tin plate.

Next, consider Oil, Gas and Mining, on page 28. Oil production goes up but steel consumption trends downward. Here again stronger and more corrosion resistant steels exert their influence.

The same is true for Railroads and Equipment, on page 28. Revenue goes up and steel consumption trends down, all because better steels are progressively developed.

Miscellaneous uses of steel also show different signs for the trend lines. Here again because of improvement in steels and changes of designs and fabrication technique.

The trend lines over a fairly representative interval (1936-1940) for the ten consuming groups are shown primarily as a demonstration of minor correction factors which must be considered when future demands are envisaged. *These trend lines are not for projection into the future—the periods covered are too short and insufficiently representative for such a purpose.* When it comes to estimating total consumption figures for each of the consuming groups for the years 1941 and 1942, however, a jab is made into the dark—nonetheless, these jabs are not too recklessly made.

Experts in each of the ten consuming industries cooperated fully in setting down what in their opinion would represent *maximum* activity for the years 1941 and 1942. These estimates, in each instance, are predicated on long personal experience, an intimate knowledge of the ramifications of each particular industry group, and careful appreciation of the impact of a continuing world war on the domestic economy. In this manner were obtained the figures shown for 1941 and 1942 consumption alongside the graph of each industry. These total figures are broken down both as to product and industry for the year 1942 in the table on page 31.

Note that this table indicates a total finished steel consumption in 1942 of 37,000,000 net tons.

To be added to this figure are export and Defense Program needs. For 1936 export was 1,548,000 net tons; for 1937, 3,033,000 tons; for 1938, 1,763,000 tons; for 1939, 2,067,000 tons. The combination of export and Defense Program needs in 1940 amounted to 10,000,000 net tons; for 1941 these two are expected to reach 13,500,000 net tons; and for 1942, export and domestic Defence Program are expected to account for 15,000,000 tons. This latter figure is somewhat under the more glorified expectations advanced by other parties, but most men directly in the industry consider it a fairly decent compromise figure. For that matter, it will likely be most difficult to get bottoms for even the 7,000,000 marked up for export. The breakdown for products in 1942 for export and Defense Program cannot be considered too reliable because there will likely be unexpected shifts in the British demands.

Therefore, the steel industry looks for total 1941 demands to range in the neighborhood of 50,000,000 net tons of finished steel; and 1942 demands to total 52,000,000 net tons. The 1942 total is broken down into its components in the table on page 31.

Ingot capacity today is variously estimated at 82,000,000 to 85,000,000 net tons per year. It was not believed possible to maintain an ingot-operating rate over a protracted period of more than 90 per cent, due to the necessity of making furnace repairs, etc.

Using this 82,000,000 net ton capacity figure, the 90 per cent operating rate, and a 70 per cent yield from ingots, a finished-steel total of almost 52,000,000 tons is obtained, which would take care of estimated 1942 demands. There would be no steel to spare, however. But still, the steel industry today is operating at such a pace as to indicate that current capacity is well above the 82,000,000 ton mark. There is growing belief that steady operation at over 90 per cent is possible—over the past several months finished steel has been turned out at a pace approaching 56,000,000 tons a year. All this would certainly assure some extra steel if England needs more than 7,000,000 tons in 1942, or if our automobile makers wish to turn out more than 4,000,000 units. Furthermore, a "just-in-case" additional protection is guaranteed by well over 1,000,000 tons of new capacity now under construction at T.C.I. and Bethlehem and a number of electric furnace installations elsewhere.

After the reader has waded through all these figures, it should be obvious that this question of steel capacity need cause no concern. There will be sufficient steel available in 1942 to meet all demands of peace and wartime industries, and likely a little to spare. Today's hysteria about an apparent overload on the steel industry could easily be liquidated by some realistic action on the part of the Priorities Board. And, obviously this dangerous practice of quiet, steady pressure on the part of many consumers to overload on stocks must be squelched. Politicians need fret less about possible shifts of steel from regular consuming channels to armament industries, with consequent throwing of men out of work and loss of tax revenue. Full support of action by the Priorities Board would be the one sure way to assure a dependable flow of steel to all consuming industries.

The Iron Age Comparison of Prices

Advances Over Past Week in Heavy Type; Declines in Italics

	Jan. 21, 1941	Jan. 14, 1941	Dec. 23, 1940	Jan. 23, 1940
Flat Rolled Steel:				
(Cents Per Lb.)				
Hot rolled sheets	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Tin and Terne Plate:				
(Dollars Per Base Box)				
Tin plate	$5.00	$5.00	$5.00	$5.00
Manufacturing ternes	4.30	4.30	4.30	4.30
Bars and Shapes:				
(Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Wire and Wire Products:				
(Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55
Rails:				
(Dollars Per Gross Ton)				
Heavy rails	$40.00	$40.00	$40.00	$40.00
Light rails	40.00	40.00	40.00	40.00
Semi-Finished Steel:				
(Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Wire Rods and Skelp:				
(Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	2.00
Skelp (grvd.)	1.90	1.90	1.90	1.90

	Jan. 21, 1941	Jan. 14, 1941	Dec. 23, 1940	Jan. 23, 1940
Pig Iron:				
(Per Gross Ton)				
No. 2 fdy., Philadelphia	$25.84	$25.84	$25.84	$24.84
No. 2, Valley furnace	24.00	24.00	24.00	23.00
No. 2, Southern Cin'ti	**24.06**	23.06	23.06	23.06
No. 2, Birmingham	19.38	19.38	19.38	19.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	23.00
Basic, del'd eastern Pa.	25.34	25.34	25.34	24.34
Basic, Valley furnace	23.50	23.50	23.50	22.50
Malleable, Chicago†	24.00	24.00	24.00	23.00
Malleable, Valley	24.00	24.00	24.00	23.00
L. S. charcoal, Chicago	30.34	30.34	30.34	30.34
Ferromanganese‡	120.00	120.00	120.00	100.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton. ‡For carlots at seaboard.

	Jan. 21, 1941	Jan. 14, 1941	Dec. 23, 1940	Jan. 23, 1940
Scrap:				
(Per Gross Ton)				
Heavy melt'g steel, P'gh.	*$21.50*	$21.75	$22.75	$18.50
Heavy melt'g steel, Phila.	*20.00*	20.50	20.75	17.75
Heavy melt'g steel, Ch'go	19.75	19.75	20.75	16.375
Carwheels, Chicago	20.75	20.75	21.75	16.75
Carwheels, Philadelphia	23.00	23.00	23.25	20.25
No. 1 cast, Pittsburgh	**22.00**	21.75	22.75	18.75
No. 1 cast, Philadelphia	**23.75**	23.50	23.75	20.25
No. 1 cast, Ch'go (net ton)	18.75	18.75	19.25	14.25
Coke, Connellsville:				
(Per Net Ton at Oven)				
Furnace coke, prompt	$5.50	$5.50	$5.50	$4.00
Foundry coke, prompt	5.75	5.75	5.75	5.50
Non-Ferrous Metals:				
(Cents per Lb. to Large Buyers)				
Copper, electro., Conn.*	12.00	12.00	12.00	12.00
Copper, Lake, New York	12.00	12.00	12.00	12.00
Tin (Straits), New York	**50.15**	50.10	50.10	45.00
Zinc, East St. Louis	7.25	7.25	7.25	5.50
Lead, St. Louis	5.35	5.35	5.35	5.35
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

*Mine producers only.

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 99-108 herein.
On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

Composite Prices

	FINISHED STEEL	PIG IRON	SCRAP STEEL
Jan. 21, 1941	2.261c. a Lb.	$23.44 a Gross Ton	$20.42 a Gross Ton
One week ago	2.261c. a Lb.	$23.44 a Gross Ton	$20.66 a Gross Ton
One month ago	2.261c. a Lb.	$23.44 a Gross Ton	$21.42 a Gross Ton
One year ago	2.261c. a Lb.	$22.61 a Gross Ton	$17.54 a Gross Ton

	FINISHED STEEL High	FINISHED STEEL Low	PIG IRON High	PIG IRON Low	SCRAP STEEL High	SCRAP STEEL Low
1941					$22.00, Jan. 7	$20.42, Jan. 23
1940	2.261c., Jan. 2	2.211c., Apr. 16	$23.44, Dec. 23	$22.61, Jan. 2	21.83, Dec. 30	16.04, Apr. 9
1939	2.286c., Jan. 3	2.236c., May 16	22.61, Sept. 19	20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.512c., May 17	2.211c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.512c., Mar. 9	2.249c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.92, Nov. 10
1936	2.249c., Dec. 28	2.016c., Mar. 10	19.74, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.062c., Oct. 1	2.056c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	**10.33, Apr. 29
1934	2.118c., Apr. 24	1.945c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.953c., Oct. 3	1.792c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.915c., Sept. 6	1.870c., Mar. 15	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.981c., Jan. 13	1.883c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.192c., Jan. 7	1.962c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.236c., May 28	2.192c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.

Based on averages for basic iron at Valley furnace and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Summary of the Week

• Heavy volume of buying extends into second and third quarters . . . Conferences with SWOC not expected to bring immediate decisions on wages and kindred matters . . . Steel and pig iron output continue to rise . . . steel scrap prices edge downward.

A HEAVY volume of orders continues to pour into sales offices of steel companies despite the efforts of the industry to allay fears among consumers as to possible shortages. With nearly all producers booked solid for this quarter, consumers are trying to protect themselves for the second quarter and even the third.

The amount of business that steel companies are taking depends largely on their policy with respect to advance bookings. Nearly all are refusing to accept blanket commitments, insisting on complete specifications. Fear of Government priorities may be one factor in the large volume of protective orders notwithstanding the fact that buyers for civilian industries know that priorities would automatically affect them. Many export orders from neutral countries are going begging because steel companies are unwilling to quote firm prices for the deferred deliveries they are obliged to offer.

SOME of the steel companies are now working more closely with customers so that steel produced will be put to immediate use rather than be added to inventories. Buyers have been asked to cooperate by notifying the mills when any delay in construction work or other activities makes it possible for shipment to be deferred beyond the date originally specified. This method of allocating material for immediate use has been employed in other metal lines, notably aluminum, nickel and zinc, for some time. It is also being followed now in pig iron, which is being distributed as required and not for putting in stock.

Price is not a factor in the current rush to buy ahead because all orders for shipment beyond this quarter are taken on the basis of price in effect at time of shipment. Whether steel prices might go up in the event of wage increases in the steel industry is a subject for speculation.

This week's meetings between some of the leading steel companies and officers of the Steel Workers Organizing Committee will be merely exploratory and cannot be expected to produce any immediate decisions in the matter of wages and other subjects to be discussed.

STEEL earnings in the final period of 1940 were undoubtedly larger than those reported for the third quarter, but a wage increase without compensating price increases would place steel companies in a less favorable earnings position. This year's steel industry payroll will be in excess of a billion dollars, based on last year's peak monthly total of $90,767,629 in October, thus a 10 per cent wage rise for all workers would add more than $100,000,000 to the labor cost on a possible output of 55,000,000 to 60,000,000 net tons of finished steel, assuming a peak rate of operations throughout the year.

The automobile industry has been one of the heavy buyers of steel recently, its orders being predicated on a high rate of output of motor cars at least through June. Defense requirements, however, are steadily mounting. Fabricated structural steel awards of 55,750 tons are the second highest weekly total since the defense program was started. This figure includes 30,000 tons for a Naval ordnance plant at Charleston, W. Va., 3000 tons for a Naval ordnance plant at Wilmington, Ill., and 3000 tons for a shell loading plant at Ravenna, Ohio. New projects of 35,300 tons include 10,000 tons for Army piers and warehouses at Oakland, Cal., and 21,000 tons for various airplane plants and hangars. Reinforcing steel projects totaling 22,680 tons include 15,000 tons for an air base in Porto Rico.

PRODUCTION of steel and pig iron continues to rise. This week's ingot rate of 99 per cent is the highest percentage rate since 1929 and the highest tonnage rate ever recorded, since capacity is considerably greater now than in 1929. Additional blast furnaces are being put on. One just started up at Donora, Pa., by the American Steel & Wire Co. had not been operated since 1930. Although consumption of Lake Superior iron ore in December, at 6,173,038 gross tons, was the largest on record, stocks at furnaces and on docks on Jan. 1, amounting to 36,072,833 tons, indicate that there will still be about 12,000,000 tons available when navigation opens in the spring.

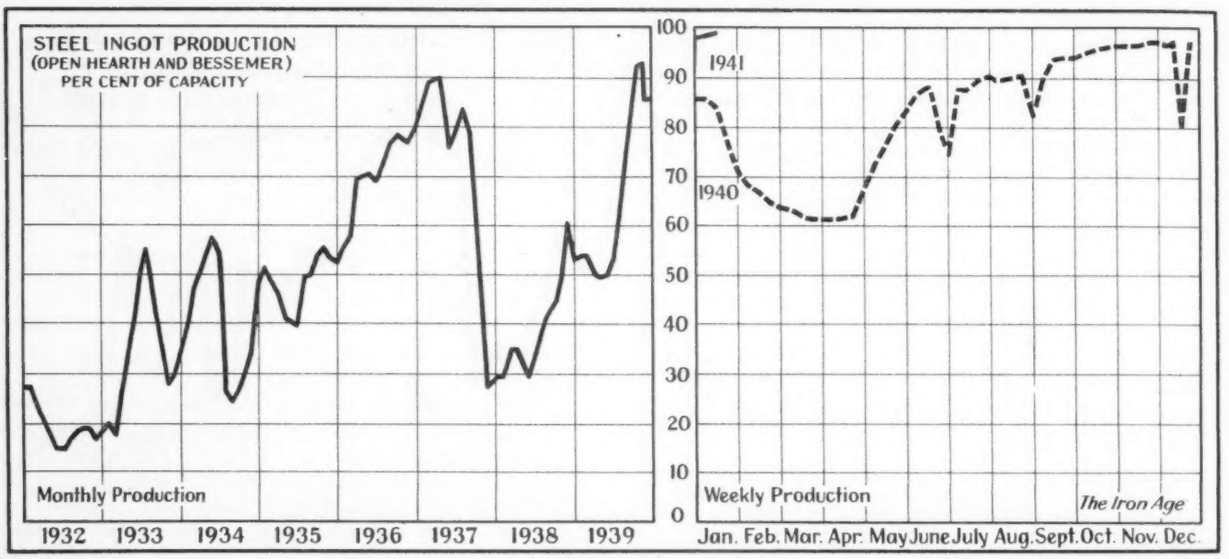
Steel scrap prices continue to edge downward, but prices of cast grades and specialties in some districts are resisting the trend. THE IRON AGE scrap composite price has declined 24c. to $20.42, which is below the level at the time of the first scrap price stabilization meeting in Washington last October.

The Industrial Pace . . .

A REDUCTION OF ACTIVITY in two of the durable goods industries included in THE IRON AGE index of capital goods activity during the past week lowered the index less than 1 per cent. The heavy construction component declined 14.3 points when total volume of awards fell to $89,174,000 from $157,823,000 in the preceding week, while the series reflecting activity in the Pittsburgh district was off 1.8 points. Steel ingot production advanced less than seasonally to 98.0 per cent of capacity, leaving the component at 135.3. The lumber carloadings series rose 8.4 points to 81.2.

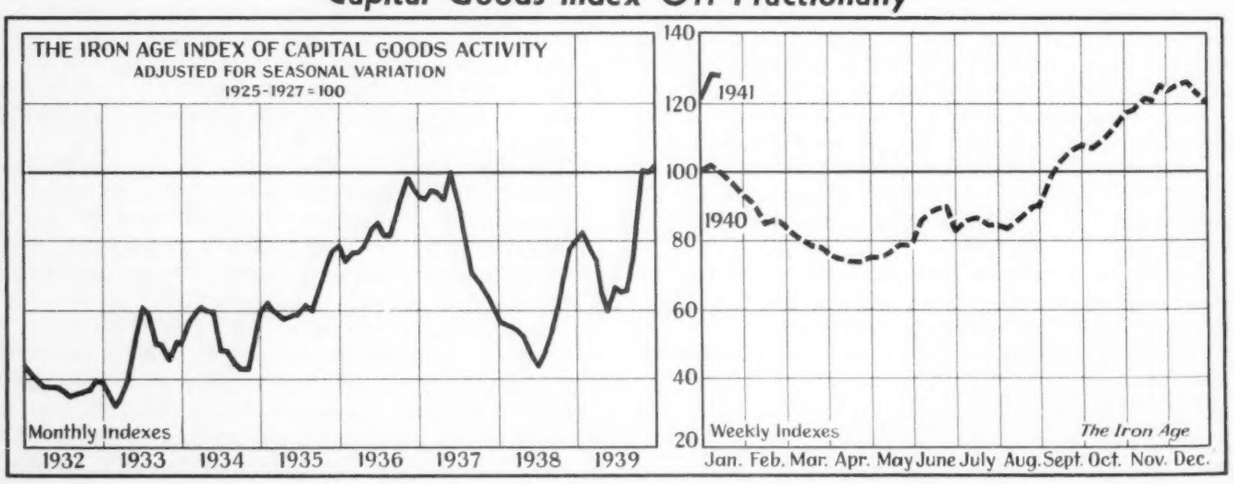
The U. S. Steel Corp. in 1940 shipped 14,976,110 net tons of finished steel, 28 per cent more than the 11,707,251 tons shipped in 1930. December shipments were the second highest of the year, being 1,544,623 tons, as compared with 1,425,352 tons in November. Production of electric energy in November on a daily basis rose to 425,027,000 kw-hr. from 421,290,000 kw-hr. in October, although the monthly total fell off slightly because of the shorter month. Fabricated structural steel bookings in November totaled 129,257 tons, as compared with 235,146 tons in October, and 99,316 tons in November, 1939.

Ingot Production Rises to 99%



District Ingot Production, Per Cent of Capacity		Pitts-burgh	Chicago	Valleys	Phila-delphia	Cleve-land	Buffalo	Wheel-ing	Detroit	Southern	S. Ohio River	West-ern	St. Louis	East-ern	Aggre-gate
	Current Week . .	100.0	97.0	99.0	94.0	88.0	104.5	104.0	100.0	94.0	104.5	82.5	102.5	107.0	**99.0**
	Previous Week . .	98.0	98.0	98.0	94.0	91.0	104.5	104.0	100.0	94.0	104.5	82.5	102.5	113.0	**98.0**

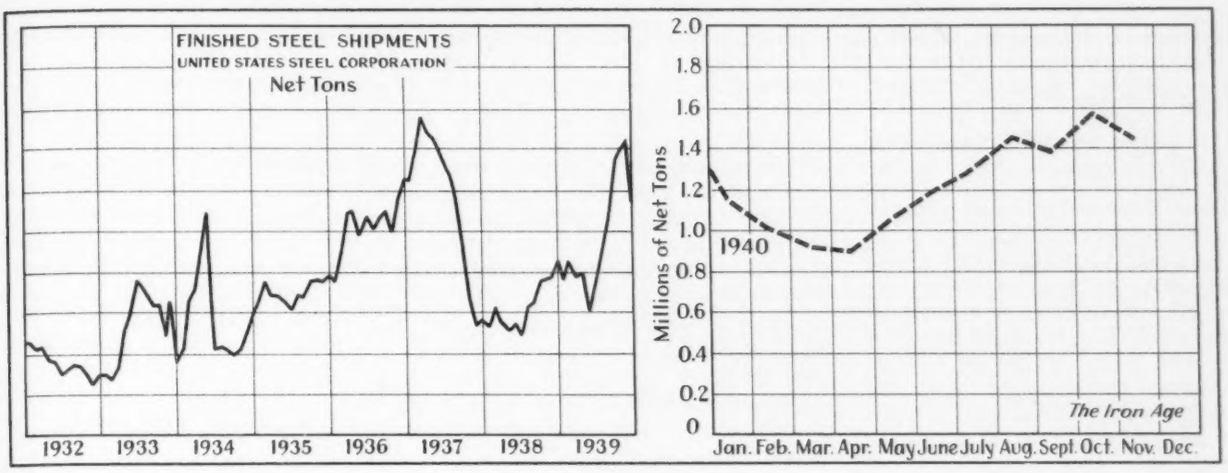
Capital Goods Index Off Fractionally



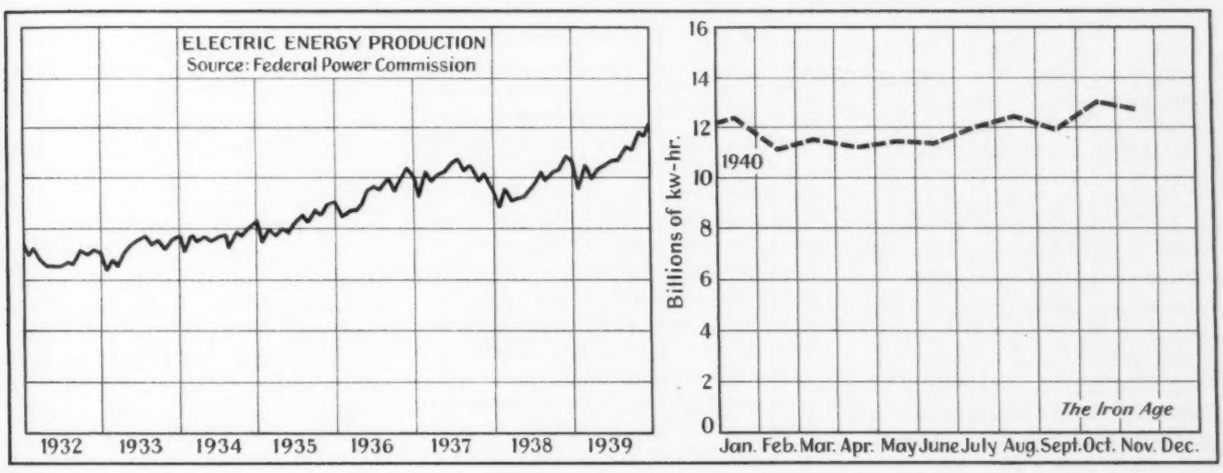
Component — Week Ended →	Jan. 18	Jan. 11	Dec. 12	Jan. 20 1940	Jan. 19 1929
Steel ingot production[1]	135.3	137.2	138.2	118.8	118.7
Automobile production[2]	134.7	126.6	125.3	118.0	154.0
Construction contracts[3]	157.7	172.0	159.9	85.1	122.7
Forest products carloadings[4]	81.2	72.8	87.5	64.8	134.7
Pittsburgh output and shipments[5]	130.2	132.6	126.9	116.3	118.6
COMBINED INDEX	127.8	128.2	127.6	100.6	129.7

Sources: [1] THE IRON AGE; [2] Wards Automotive Reports; [3] *Engineering News-Record*; [4] Association of American Railroads; [5] University of Pittsburgh. Indexes of forest products carloadings and activity in Pittsburgh area reflect conditions as of week ended Jan. 11. Other indexes cover week of Jan. 18.

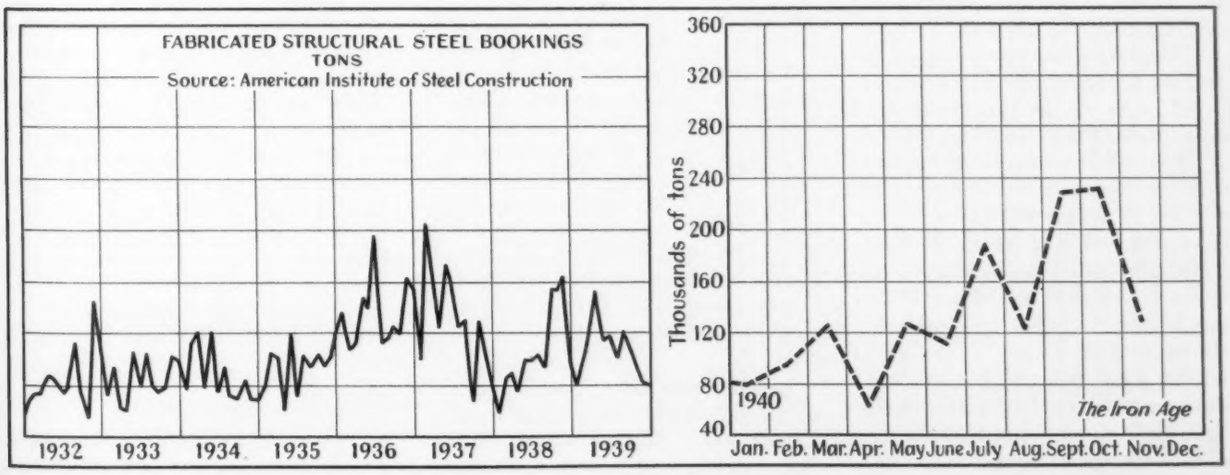
U. S. Steel Shipments in 1940 at 11-Year Peak


FINISHED STEEL SHIPMENTS
UNITED STATES STEEL CORPORATION
Net Tons
1932 1933 1934 1935 1936 1937 1938 1939
Millions of Net Tons
2.0 1.8 1.6 1.4 1.2 1.0 0.8 0.6 0.4 0.2 0
1940
The Iron Age
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.

Daily Power Output in November Up Slightly


ELECTRIC ENERGY PRODUCTION
Source: Federal Power Commission
1932 1933 1934 1935 1936 1937 1938 1939
Billions of kw-hr.
16 14 12 10 8 6 4 2 0
1940
The Iron Age
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.

Fabricated Steel Bookings Decline in November


FABRICATED STRUCTURAL STEEL BOOKINGS
TONS
Source: American Institute of Steel Construction
1932 1933 1934 1935 1936 1937 1938 1939
Thousands of tons
360 320 280 240 200 160 120 80 40
1940
The Iron Age
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.

Market News

. . . THE WEEK'S ACTIVITIES IN IRON AND STEEL

New Business

. . . Unprecedented volume of orders continues

Despite the effort of steel makers at PITTSBURGH to allay consumer fears regarding possible steel shortages, an unprecedented volume of new business continues to pour in. Although some companies have not booked as much tonnage as in the corresponding December period, the majority of steel makers are reflecting an actual increase. PITTSBURGH notes automotive orders coming in at a rate as strong, if not stronger, than in December. Demand remains highly diversified. Some consumers are continually demanding assurances that orders now being placed will be shipped in accordance with initial conversations. Practically all business now going on the books is for second quarter delivery and some material is being scheduled for third quarter. It is pointed out that considerable room still remains for second quarter shipment but total backlogs already are running from three to four months.

Shipments of steel in the CLEVELAND area are of record proportions and still edging upward, but are only one-half to two-thirds of aggregate tonnages being sold in the district, according to a survey by THE IRON AGE. This situation exists even though sellers are limiting many customers to their usual requirements plus reasonable allowance for expected manufacturing gains.

In some cases examination of consumers' inventories and production schedules shows that pressure being put upon mills to obtain deliveries is overdone. Leading sellers state that, with cooperation on the part of buyers, steel would be available to all in ample amounts.

It is expected at CLEVELAND that coordination will be achieved so that steel will not be delivered to places where it cannot be used immediately. For example, if construction falls behind schedule or machinery is delayed in arriving at certain new plants, notification to steel mills would in many cases enable rolling schedules to be changed and raw steel utilized to best advantage.

At CHICAGO virtually every product, with the exception of tin plate, is sold out well into the second quarter. Pressure is still strong and cases of so-called "emergency" deliveries are increasing.

Specifications in that district are still well ahead of shipments, backlogs building up steadily. January business is either on a par or from 5 to 15 per cent ahead of the previous month, depending upon the producer. While defense needs grow each week, general domestic consumption shows lasting qualities which were generally unexpected. Along with household appliances and agricultural equipment demand, automotive purchases hold a steady pace. The impact of the preparedness program is heightening steadily as more and more jobs in that area emerge from the blueprint stage. And railroad demand is providing more new orders, even though many 1941 programs had already been laid before steelmakers. CHICAGO mills are gradually lengthening deliveries on most products; and warehouses there are facing a heavy demand.

The problem of delivery on orders already placed is growing in importance at BIRMINGHAM. Orders on some products are being returned to the buyer by at least one major producer there with instructions that delivery cannot be made during the first quarter and orders will be accepted only for shipment at the mill's convenience on the basis of price in effect at the time.

No slackening in the heavy volume of new orders has developed in EASTERN PENNSYLVANIA. Mills are giving the best shipment possible, although there are indications in some cases that shipment is being asked before material can be used. Sheets, plates, bars and structural shapes are being heavily booked for second quarter and a few sheet and bar orders taken for early third quarter.

Indications that the booming shipbuilding industry on the Pacific Coast has by no means reached its full growth came last week with awards by the Maritime Commission of contracts to California Shipbuilding Co. Los Angeles, and Oregon Shipbuilding Co., Portland, for construction of eight ways at each point. Prefabricated cargo vessels will be assembled at the new plants, it was announced, but no indication was given as to where fabrication would take place. The companies are affiliates of the Todd group, which recently announced plans for a large new yard at Richmond, Cal., on San Francisco Bay. Southwest Welding & Mfg. Co., Alhambra, Cal., and Keystone Tool & Supply Co., Los Angeles, each has made application for lease of property for "installation of a shipyard" at Los Angeles harbor.

Steel Operations

. . . Industry steps up rate to 99 per cent, may go higher

The Pittsburgh district attained an average operating rate this week of 100 per cent, so some plants there as elsewhere are operating above their practical rated capacity. The rate for the industry as a whole is calculated at 99 per cent. The American Iron and Steel Institute estimate on Monday was 99.1 per cent.

The institute's weekly estimates and those of THE IRON AGE are based on the computed capacity as of Dec. 31, 1939, since which time there has been a considerable increase, especially in electric furnace steel. A new capacity rating as of Dec. 31, 1940, will be put into use by the institute within a short time, and the higher capacity that will be shown may result in a slight readjustment downward of the percentage rate, but in all probability after this adjustment is made the rate of operations will continue to edge upward to the limit of possible output.

Semi-Finished Steel

. . . Production earmarked for some months ahead

Incoming business continues to exceed production and shipments

and all semi-finished steel capacity is earmarked for some months to come. Rerolling billets form a substantial part of current British buying. Some PITTSBURGH area mills have been successful in having steel ingots processed into billets by a non-integrated mill, thus relieving some of the tension at this point.

Pig Iron

. . . Increases in production noted in some areas

Pig iron production has hit a new peak in the CLEVELAND-YOUNGSTOWN area and one additional stack for steel-making iron is scheduled to go into blast in February. Merchant iron sellers at CLEVELAND report that foundries are consuming iron almost immediately upon receipt. Some consumers have virtually no inventory. Producers' stocks are also low in popular analyses.

At Donora, Pa., No. 1 blast furnace of American Steel & Wire Co. was lighted Saturday, Jan. 18. The furnace, which has been idle since October, 1930, was relined and improved with the addition of a new primary gas washer. The lining of the stoves also was changed in design which allowed the elimination of one stove.

Production in the BIRMINGHAM district returned to capacity this week following completion of repairs at No. 3 furnace of the Tennessee Coal, Iron & Railroad Co. With relining of this furnace completed ahead of schedule, all 18 furnaces in the district are in blast. No. 3 furnace was scheduled to go in early this week.

At PITTSBURGH three or four steel companies are still quietly inquiring for steel making iron with no success reported so far.

Buffalo merchant pig iron manufacturers now are virtually sold out for first quarter delivery with practically all regular customers well covered. Repairs to Hanna Furnace Co.'s fourth blast stack are being rushed so as to complete the job as soon as possible. Construction has been started on Bethlehem's new stack at the Lackawanna plant.

The Hamilton Coke & Iron unit of the American Rolling Mill Co. continues out of the market on merchant iron, since all production from both of its blast furnaces is being diverted to Armco's Middletown plant. While no definite announcement on prices has yet been made in that area, it is generally accepted in the market that quotations will be in line with other markets.

A situation prevalent in all markets is the care that is being taken by merchant sellers to guard against selling purely protective tonnages. Merchant producers are seeing to it that their customers do not run out of iron, but they are not permitting them to put iron in stock beyond their nearby requirements.

Reinforcing Steel

. . . Awards 10,000 tons and new projects 22,680 tons

Reinforcing steel awards total 10,000 tons. The largest lettings are 2650 tons at Columbus, Ohio, for a quartermaster warehouse, 2500 tons for an army proving ground at Madison, Ind., and 1200 tons for a du Pont Nylon plant at Martinsville, Va.

New reinforcing steel projects of 22,680 tons include 15,000 tons for an air base at Borinquen Field, Porto Rico, 2500 tons for the Elwood Ordnance Plant at Wilmington, Ill., and 1000 tons for a chemical plant at Monsanto, Ill., for the Monsanto Chemical Co.

Although rail steel reinforcing bars are still officially quoted at $2 a ton under new billet reinforcing bars, the number of jobs on which rail steel is being utilized at the new billet price is increasing. The trend is definitely toward a price parity.

Sheets and Strip

. . . Orders are heavy for the second quarter

Automotive buying of sheets remains substantial at PITTSBURGH, other flat rolled consumers are specifying heavily for second quarter shipment, backlogs are increasing, and, consequently, deliveries are becoming further extended. No small part of this condition has been brought about by consumer fears that future deliveries may not be had when wanted, a frame of mind which steel mills have done all in their power to eliminate. Some customers are now worried because of the labor outlook and have already contacted mills for information on this point.

Operations at wide hot mills in CLEVELAND are averaging better than five days per week, due to occasional seven-day operation. Wide cold mills are operating full through the week. Annealing capacity and pickling lines are jammed. Sellers report that demand for strip from tube mills is very great with some of these consumers seeking to cover their requirements for months ahead.

Sheet demand at CHICAGO is widespread and strong. Fresh orders are ahead of shipments. Deliveries are extended to May at most mills and to June in some sizes.

In the Southern Ohio district the leading interest is out of the market for this quarter. Nevertheless, bookings continue to flow in and are placed on second quarter books at prices then in effect. Other sheet interests in the area are rapidly filling books, although there is a reluctance to permit ordering beyond this quarter. Some tonnage, however, that has been contingently accepted may be rolled within the next two months, provided no defense priorities become effective.

Iron Ore

. . . December consumption largest on record

Consumption of Lake Superior iron ore during December totaled 6,173,038 gross tons, largest amount for any month since records were first kept in 1918, the Lake Superior Iron Ore Association reports.

For the full year consumption was 62,426,314 gross tons, largest since 1929's 63,646,000 tons. Consumption in 1939 amounted to 44,361,289 tons.

During 1940 furnaces using Lake Superior ore consumed 1.74 tons for each ton of pig iron produced. This average is identical with the 1937 average.

Previous monthly consumption record was established in May, 1923, at 6,119,000 tons. The ore melt in November, 1940, was 5,973,007 tons, and in December, 1939, was 5,538,374 tons.

Consumption in the final quarter of 1940, at 17,562,728 gross tons, fell about 120,000 tons short

of the all-time record established in May, June and July, 1923.

Lake Superior iron ore on hand at furnaces on Jan. 1, 1941, was 31,791,961 tons and on Lake Erie docks at 4,280,872 tons, for a total lower Lake supply of 36,072,833 tons. This compares with 41,711,-704 tons one month before and 35,-439,773 tons a year ago. This indicates that at the current high rate of use, stocks on hand next May 1 will be close to 12,000,000 tons, lowest on record.

Furnaces in blast using Lake Superior ore at the end of December continued at 166 of an available 189, the same rate as one month earlier. A year ago 155 of such furnaces were in commission.

The Tennessee Coal, Iron & Railroad Co. placed its Wenonah ore mine on double turn Jan. 19, bringing all eight of the company's red ore mines to a five-day, double turn basis. Close to 125 men were given employment by the schedule increase.

Tubular Goods

. . . Business is moderately active

Tubular goods sales at PITTSBURGH are substantially unchanged from a week ago, with no important market developments noted.

CHICAGO interests find pipe activity moderate. Defense construction such as cantonments have furnished some important business and are expected to provide much more. Pipe orders have generally been small but steady. Jobbers enjoy a steady demand.

Merchant Bars

. . . No abatement in heavy buying . . . Deliveries lengthen

With the automotive industry continuing its heavy volume of buying, unabated from December levels, and with national defense requirements increasing, no letdown in PITTSBURGH bar mill operations is expected for months to come. Orders are still flowing to the mills in substantial quantities from every conceivable consumer point and deliveries are in no better shape than a week ago.

Unshipped tonnage held by CLEVELAND and YOUNGSTOWN producers is still rising because of the extended buying by consumers. Sellers are predicating acceptance upon customers' usual requirements plus reasonable allowance for expected increases in manufacturing operations. One guide commonly used is an average of consumption in the last 10 months of 1940. British specifications have been received during the past week.

One CHICAGO mill promises flats in May, rounds in June and bar mill shapes in late May. Another producer extended carbon bars promises this week to three and one-half to four months. Both carbon and alloy bars are exceptionally active there since increasing defense demands bolstered by a continuously strong general buying is forcing backlogs higher.

Structural Steel

. . . Structural steel awards of 55,750 tons include 30,000 tons for ordnance plant

Fabricated structural steel awards of 55,750 tons are the second largest since the National Defense Program was started. The outstanding letting of the week is 30,000 tons for a naval ordnance plant at Charleston, W. Va. Other awards of size are 3400 tons for heavy framing for the Elwood Ordnance plant at Wilmington, Ill.; 3000 tons for 58 buildings at Ravena, Ohio, for a shell loading plant; 2675 tons for transmission towers between Bonneville, Ore., and Oregon City for the Bonneville administration; 1600 tons for hangars for United States engineers at various locations; 1600 tons at Tellico Plains, Tenn., for transmission towers for TVA; 1200 tons for a highway bridge in St. Louis County, Mo.; 1125 tons for a state bridge at Portland, Me., and 1000 tons for tunnel linings for the Delaware aqueduct in New York.

New structural steel projects jumped to 35,305 tons from 14,250 tons last week. The largest inquiries include 10,000 tons at Oakland, Cal., for army piers and warehouses; 6000 tons for an airplane plant at Kansas City, Kan.; 5000 tons for an airplane plant at Tulsa, Okla.; 4000 tons for an airplane engine plant at South Bend, Ind., for the Studebaker Corp.; 3000 tons for an airplane parts plant for the Studebaker Corp. at Chicago; 1800 tons at Robertson, Mo., Minneapolis and Grosse Ile, Mich., for hangars for the Navy, and 1200 tons for an airplane gear plant at Fort Wayne, Ind., for the Studebaker Corp.

Pittsburgh structural mills remain at capacity operations and the influx of fresh orders practically makes certain that this condition will continue throughout 1941, especially in view of the fact that structural mills have and will continue to process shell steel.

Shipbuilding

. . . One Grace Line ship awarded to Federal

The Maritime Commission has awarded a $2,250,000 contract to the Federal Shipbuilding & Dry Dock Co., Kearny, N. J., for the construction of one C-2 type steam-propelled cargo ship for the Grace Line, Inc. Steel requirements are estimated at 3600 tons. Award of the contract made it necessary for the company to specify that completion dates on certain other ships now under construction for the commission will have to be extended.

Railroad Buying

. . . Burlington orders 250 cars

. . . A few small inquiries out

St. Louis-San Francisco Railway has ordered 12,320 tons of 112-lb. rails and accessories from the Tennessee Coal, Iron & Railroad Co.

The Burlington has purchased 250 70-ton ballast cars from the American Car & Foundry Co.

The federal court at St. Louis authorized the Missouri-Pacific Railway to build six freight locomotives, eight mail and baggage cars, 150 50-ton rack cars, and to improve three passenger cars and 1700 freight cars. Stokers are to be fitted to 23 locomotives.

Inquiries come from the Virginian, the Lake Superior & Ispeming and the Bethlehem Steel Co., each for 100 freight cars. Louisville & Nashville is expected to buy 50 hopper cars of 70-ton capacity and the New Haven is inquiring for 10 diesel-electric switchers.

Chesapeake & Ohio is reported

circulating inquiries for a car repair program which will involve around 2000 tons of steel, to be followed by additional inquiries in the near future of the same size.

Wire Products

. . . Orders are in excess of shipments

New orders exceed shipments but the wire market is somewhat calmer than other steel product markets. Manufacturers' demand is heavy at PITTSBURGH with merchant wire requirements matching expectations.

Demand for leading items in the manufacturers' division remains above output at CLEVELAND. Shipments of electric welded mesh and other construction items are far above the usual January level.

January orders are slightly ahead of December's for most CHICAGO mills due to a widespread, general demand for wire products. Fencing—defense, industrial and aggricultural—is active; and a large order was just received by one mill from a bedding manufacturer. Jobbers there are especially busy.

Plates

. . . Lukens expansion to provide larger output of wide material

The awarding of $2,160,000 to the Lukens Steel Co., Coatesville, Pa., by the Navy Department will provide additional capacity for the rolling of wide plates for naval and merchant ship construction and other defense work. Additional soaking pits and enlargement of present pits and other improvements to permit the handling of larger ingots will make it possible for the Lukens company to obtain a larger output from its 206-in. mill, the only plate mill of that size. July 1 is the date set for completion.

Plate mill backlogs in the CLEVELAND and YOUNGSTOWN areas continue to rise and delivery promises are more extended. Heavy inquiries involve construction of Scotch marine boilers, Army tanks and trailers for hauling tanks. Output of 4000 tons of wide plates a week is not uncommon for at least one Ohio continuous mill.

Increasingly heavy tonnages for second quarter delivery are being placed by many consumers in the EASTERN PENNSLVANIA district. First quarter shipment is now practically impossible to obtain in any quantity. A large shipyard is beginning to place orders for 20,000 tons of material, although some difficulty is foreseen in shipping within the time requested.

Railroad activity at CHICAGO is at a peak. One car manufacturer is seeking steel for over 1000 different sizes and types, the Chicago, Burlington & Quincy is reported to have an inquiry out for 4125 box cars and the Milwaukee Road is reputedly circulating an inquiry for 500 freight cars. Tank manufacturers are specifying in volume and general demand is heavy enough to push deliveries back gradually to an overage of May promises for most sizes at most mills.

Western Pipe & Steel Co., San Francisco, will fabricate 6500 tons of plates for the Shasta Dam penstocks under a Bureau of Reclamation award.

Warehouse Business

. . . Pittsburgh distributers adjust sheet and strip prices

PITTSBURGH **warehouse** interests have advanced the price on hot rolled sheets and strip $4 a ton, a move which nullifies a reduction made last year following the break in mill prices. The advance is in reality a restoration of the warehouse flat rolled prices to conform with the official mill price.

Tin Plate

. . . Cold reduction mills operating at 78%

Fresh orders are on a par with a week ago and cold reduction mills are operating at about 78 per cent, unchanged from last week.

NAM Begins National Inventory of Plants

Washington

• • • **Looking to the** most comprehensive mobilization of the nation's resources ever undertaken, the National Association of Manufacturers in a practical commemoration of the current "Preparedness Week," is gathering from every plant known to the association information regarding facilities for use in an "all-out" defense program.

The information, to be compiled this week, will be turned over to the National Defense Advisory Commission. William S. Knudsen, director of the Office of Production Management, in a letter to President Walter D. Fuller, NAM president, urged manufacturers to give the greatest possible performances "of American ingenuity, backed by every machine and piece of equipment available."

The NAM survey, made through an exhaustive questionnaire, contemplates the 100 per cent armament asked for by Mr. Knudsen. It covers every known plant, regardless of size, the small foundry, "back-alley parts" maker, the one-man machine shop, up to the largest organizations of the country. Should any plant, small, new, obscure, large and well known, have failed to receive an NAM questionnaire, the OPM has asked that the plant notify the NAM. The association will analyze the data gathered and turn the information over to the OPM.

New Small Buick Will Be Announced

Detroit

• • • **A surprise preview** of a new, additional line of short-wheelbase Buicks was scheduled for Thursday (Jan. 23) at Flint, Mich., it was revealed in telegrams to the press sent out Monday morning. The cars will be announced to the public about Feb. 1, it was stated by the factory officials.

The "little" Buick has been rumored recently around Detroit, but not confirmed. The body, from the same Fisher dies as the modified torpedo-type Chevrolet, is also the one offered by Olds and Pontiac on part of their line of cars. The car, believed to be designated the Buick "30," along with the "40," et al, will use the smallest Buick engine, it is known.

Machine Tools

. . . SALES, INQUIRIES AND MARKET NEWS

Government Issuing Blanket Orders

New York

• • • **Orders are still running** well in excess of shipments, the ratio being as much as three to one for one dealer here. Another index of current activity is the fact that one automatic screw machine seller sold five times as many machines in the first 20 days of January as for the same period in 1940. Deliveries are being quoted from September well into 1942, except for contracts bearing high priority ratings. Machine tool builders in New England are buying heavily once more as it becomes apparent that greater output is required. Such buyers, with A-1-A priority, are going to get these additional machine tools within a few months.

An attempt is being made in Washington to estimate the entire demand for machine tools used to further the defense program. To enable machine tool builders to plan production ahead, they have been issued blanket orders representing estimated requirements of machines by sizes for the year. Many of these blanket orders are being jobbed out in their entirety to subcontractors. Machines sold to defense contractors will be credited against these blanket orders. In effect, the Government guarantees the orders and agrees to pay for any unsold machines. Some of these orders entail 800 to 1000 machines. Sizes for which there is little demand are being dropped in order to speed up production on popular sizes.

Shipments at Accelerated Pace

Chicago

• • • **With orders for more tools** no longer the subject of exciting news to machine tool manufacturers in this area, the important fact right now is that the industry is shipping equipment at an accelerated pace. Schedules are now in operation which can meet priorities with less difficulty. Practically every manufacturer in Illinois and Wisconsin has increased his plant space and equipment and, though much of this expansion is still in the construction stage, an imposing percentage is already showing production results.

With plant expansions springing up on all sides, many new purchasing programs are in motion. Rheem Mfg. Co. will spend about $150,000 for new equipment; General Electric X-Ray Corp. is reported to be readying a plant expansion and buying program; the airplane engine order awarded to the Studebaker Corp. will bring heavy machinery purchases; Gisholt Machine Co., Madison, Wis., has reopened its northern works and reportedly will require more equipment. Many other programs are either fully launched or will be underway soon.

1941 Books Being Filled

Cincinnati

• • • **Fresh demand for machinery** in this area continues to follow the same aggressive pattern noted during the last half of 1940. Manufacturers are filling up odds and ends on their 1941 books and pushing some of the orders over into their manufacturing schedule for the following year. Production schedules are being stepped up in an effort to increase production during the current year, and plants with new building plans are pressing them to rapid completion. While there have been no major plant expansions completed as yet, no complaint about receiving equipment for the small plant additions has been heard.

Further Plant Expansion Seen

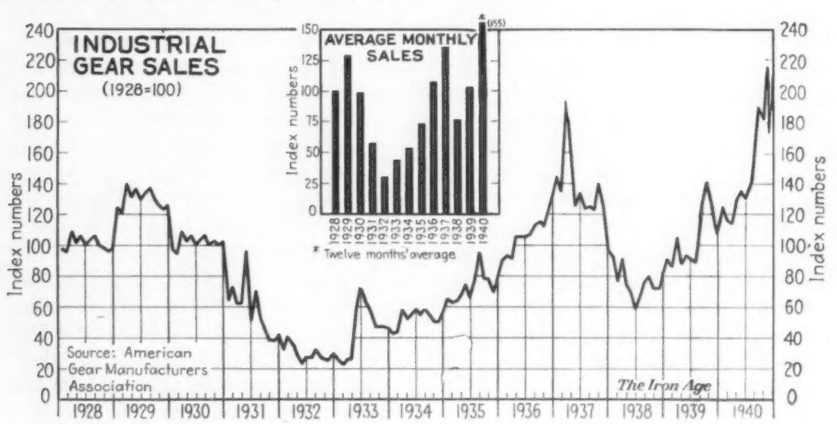
Cleveland

• • • **Machine tool producers,** who a few weeks ago thought that their large expansions of 1940 might be ample to meet the load from the defense program, are now reported considering further large additions. At the same time, badly needed production equipment for existing plants is being received at a better rate, facilitating current production and adding to machine tool plant employment.

However, some of the foremost production problems, such as securing enough equipment for gear grinding, are still apparent in this vicinity. Planers also are in great demand for use in machine tool plants.

Gear Sales In 1940 Highest On Record

SALES of industrial gears, excluding automotive gears and gears used in high speed turbine drives, rose to an all-time high in 1940, according to the index compiled by the American Gear Manufacturers Association. Average monthly index for the year was 155, exceeding the previous peak of 135½, established in 1937, by 14.4 per cent, and topping the 1939 average, 103, by 50 per cent. In 1929, third highest peak year, the average monthly index was 128½. Sales in the month of December rose 20 per cent above November and were 87 per cent ahead of December, 1939. The December index, 208, was the second highest on record, having been exceeded only in October of the same year when it touched 216. In November the index stood at 173, and in December, 1939, at 111.


INDUSTRIAL GEAR SALES
(1928=100)
AVERAGE MONTHLY SALES
Index numbers
* Twelve months' average
Source: American Gear Manufacturers Association
The Iron Age
1928 1929 1930 1931 1932 1933 1934 1935 1936 1937 1938 1939 1940

Non-Ferrous Metals

. . . MARKET ACTIVITIES AND PRICE TRENDS

New York, Jan. 21—The probability of official government priorities in the copper and zinc markets in the not-far-distant future looms ever larger as supplies of the two metals continue to grow tighter. Sales of domestic copper, which are in about the same volume as December, consistently exceed production, making January's total to date about 48,000 tons. Prices of all non-ferrous metal but tin were unchanged in the past week and the volume of activity corresponded rather closely to that of the previous period. Prompt Straits tin advanced to 50.15c., although sales were in small volume.

Very little copper for delivery in March remains available and most of the current activity is in the April position. Mine producers' quotations remained fixed at 12c. a lb., delivered Connecticut Valley, while the process of rationing supplies continued. Custom smelters' prices remain firm at 12.50c. for March, a good volume of business being done in the week at that level. Again, moderate activity was reported in the export market at 10.25c. a lb., f.a.s.

Zinc

A few transactions involving carload lots for prompt shipment still occur regularly from week to week but such business is, of course, very strictly limited and the ever-tightening supply situation holds sellers in a position where they are forced to continue spreading limited supplies over the greatest possible area, with the primary obligation of giving preference to those consumers in most immediate need. Prime Western remains unchanged at 7.64c. a lb., delivered New York, and in view of government attitude, is likely to remain there indefinitely while very firmly supported. Sales of slab zinc in the past week totaled 5963 tons, somewhat lower than the 6106 tons sold in the previous week. Shipments also declined slightly to 5095 tons, as compared with 5673 tons. Unfilled orders increased to 122,550 tons from 121,702 tons in the preceding week.

Lead

A fairly good, though not heavy, volume of business was booked by sellers in the past week on the firm and well-established basis of 5.50c. a lb., delivered New York. Buying was again somewhat irregular as to time and direction but, by the time the week ended, most producers had reported a volume of transactions well up to and, in some cases better than, quotas. Consumers are not in any extreme hurry to fill forward needs and little pressure for material has been in evidence. January requirements, which were 95 per cent covered at the end of the previous week, still lack about 2 per cent of being completely filled, while February is now about 55 per cent accounted for. Major reason for the rather leisurely rate of transactions is the realization on the part of buyers that ample stocks of foreign metal are available in the event a domestic shortage developed.

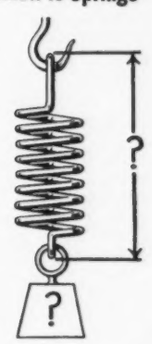
Tin

Although activity fell to negligible proportions again in the past week, the fact that there was apparently slightly less spot material than had previously been estimated strengthened the price covering this position somewhat. On Wednesday of that week prompt Straits metal rose to 50.15c. a lb., delivered New York, from the level of 50.10c. which had been maintained for the previous two weeks. Consumers generally are showing a minimum of interest.

(Non-ferrous prices on page 103)

the practical side of Springmaking—BY DUNBAR

"We don't know all about Springs ... but all we DO know is Springs"



We recommend a weight test in the specifications of extension springs. The tolerance desired on that specification will tell whether no test, a spot test or 100% test is necessary. As this factor can vary the cost of a spring, it is plain that easy tolerances can save you money.

There are other savings in style of end, correct material, finish, method of assembly, proper initial tension.

You may be paying for spring quality you don't need—or you may find that a *better* spring can bring you savings. It's up to a good springmaker to help you find out.

FOR PRACTICAL SPRING ADVICE, CALL ON

Dunbar Bros. Co., Bristol, Conn.

DIVISION OF ASSOCIATED SPRING CORPORATION

"Quality Springs Since 1845"

Scrap . . . MARKET ACTIVITIES AND QUOTATION TRENDS

Efforts of the scrap trade are still primarily directed toward the forcing down of price levels, and there have been further results during the past week in meeting the government's desire for a stabilized market at a level lower than that which existed a few weeks ago. The Pittsburgh price of No. 1 heavy melting steel has not yet reached the government objective of $20, the average this week at that point being appraised by THE IRON AGE at $21.50, which is a drop of 25c. from last week. The Philadelphia price on the same grade is 50c. lower at $20, while the Chicago price has remained at $19.75. THE IRON AGE scrap composite has declined 24c. this week to $20.42, which is a little below the level at the time of the first "price stabilization" meeting in Washington last October. Following that meeting THE IRON AGE composite remained at $20.67 during four consecutive weeks.

Although steel scrap prices and some other common grades have declined, the same cannot be said for cast grades and specialties, which to a large extent have resisted the downward trend. The Gray Iron Founders Society, Cleveland, has reported to Leon Henderson in Washington that the scrap situation is a "cause of considerable worry to all gray iron foundrymen." They are disturbed not only by the failure of cast grades to develop a downward trend, but they also find a similar situation in scrap rails, of which foundries are large users. A report from Dayton, Ohio, to the society mentioned a quotation of $29 on 3-ft. rails. The society made the assertion that railroads had been instructed to sell old rails to rerolling mills.

An upward price trend developed at Boston, where dealers raised their bids after lowering them a week or so ago.

Pittsburgh

The market is more clarified than a week ago. Moderate sized consumer sales of No. 1 steel have been made within the past week or 10 days at $22 a ton. Within the past few days, a small tonnage of No. 1 heavy melting steel was sold into consumption at $21 a ton and one consumer at another point has been offered No. 1 at $21.50 a ton. On appraisal No. 1 heavy melting steel is quotable this week at $21 to $22 a ton, a $1 spread which fairly well covers the various factors in this market. This is a drop of 25c. a ton from last week's average. Railroad heavy melting steel is down 50c. this week, being quotable at $22 to $22.50. Undoubtedly some of the easier covering on orders during the past week has been due to accumulations built up during the 10 days or so when activity was at a standstill. The future trend of the market depends upon daily circumstances. The testing period for the Government request for lower prices is by no means at an end.

Philadelphia

Following a week when activity consisted entirely of broker purchases, several small sales have been made to district mills within the past week at reduced prices, making No. 1 heavy melting steel quotable at $20, and No. 2 steel at $18.50. Machine shop turnings are down $1 to $14.50 and shafting 50c. to $25.50.

Chicago

Stabilization came to the scrap market here this week after the excitable flurry downward following the government's request. No. 1 heavy melting steel remains at $19.50 to $20, with most brokers paying the lower price, though rumors of mill purchases at varying prices fly thick and fast. The situation in rerolling rails is still very tight owing to the extreme activity of foundries and rerolling mills. The list as a whole changed little during the past week following the $1 decline. The market tone is firmer than a week ago.

Youngstown

The market is nominally lower here this week, No. 1 being quoted at $21.50 to $22 a ton, a reduction of 50c. This is due more to the government's attitude than any other factor, since consumption remains as high as ever and collections are hampered by seasonal conditions.

Cleveland

Prices have drifted lower here but still remain nominal. No. 1 heavy melting is quoted at $20.50 to $21, a drop of 50c. During the past week the only activity of importance was the sale of automotive scrap and the prices were off by the same margin as the railroad lists a few days earlier.

Buffalo

In the absence of any sales into consumption in the last week, scrap quotations remain nominal. There is still a considerable amount of scrap tonnage to be delivered on contracts around $22 a ton and until this week most local dealers have been busy filling these old orders.

St. Louis

Sales of No. 2 heavy melting steel of substantial tonnages were made to an East Side and a St. Louis mill on the basis of the dealers' buying price of $17 as a maximum, a reduction of 50c. a ton from last week's prices being made in keeping with the government's policy for price stabilization. The tonnages were placed with four brokers for shipment over the next 60 days. Most other items are off from 50c. to $1 a ton. Country shippers are cooperating in the new price structure and considerable selling has been done at the lower price levels.

Cincinnati

Some uncertainty as to the direction of price trend is felt among old material dealers, although a desire is expressed to accede to the government's request for lower prices. Formal prices on all steel items have been reduced another 50c. during the past week, but cupola scrap prices are unchanged. Shipments on contract continue, although the trade indicates some producer resistance thus holding down the available supply of old materials.

Birmingham

Prices on open hearth grades are unchanged here following last week's $1 reduction but blast furnace grades are back at the former level. The reduction in price on open hearth items has temporarily slowed up movement. Some dealers apparently have yet to recognize the significance of the position taken by Washington on price schedules.

Detroit

Extreme softness characterizes the open hearth grades in this area, with scrap coming out in great quantities and pressure tending, therefore, to lower prices again. Only in foundry grades is strength reported, and this consists of a demand for out-state and Ohio consumption rather than any demand for melting here since the Detroit foundries are at the ebb of their operations.

New York

This market is characterized by confusion regarding the price level and quotations must be considered nominal. While some dealers are paying a somewhat higher price for eastern Pennsylvania deliveries against old orders, No. 1 and No. 2 were marked down 50c. from last week.

Boston

The situation here is peculiar. After a general sharp reaction following Washington's request for lower prices, quotations have snapped right back and in a number of instances are where they were prior to the Washington meeting. There are, however, cases where prices are $1.25 to $1.75 a ton under recent peaks. Export demand is heavy. Shippers quote No. 1 at $16.50 a ton delivered dock, but several sellers report they are being paid $17.25, a price just about on a par with that prevailing before the Washington meeting. Yard prices for Nos. 1 and 2 steel are up $2 a ton from recent lows.

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$21.00 to $22.00
Railroad heavy mltng.	22.00 to 22.50
No. 2 heavy melting	19.50 to 20.50
Railroad scrap rails	22.50 to 23.00
Rails 2 ft. and under	26.50 to 27.00
Comp. sheet steel	21.50 to 22.00
Hand bundled sheets	20.50 to 21.00
Heavy steel axle turn.	20.50 to 21.00
Heavy steel forge turn.	19.50 to 20.00
Machine shop turnings	15.50 to 16.00
Short shov. turn. alloy free	16.00 to 16.50
Mixed bor. & turn.	15.50 to 16.00
Cast iron borings	16.00 to 16.50
Cast iron carwheels	22.00 to 22.50
Heavy breakable cast.	17.00 to 17.50
No. 1 cupola cast	22.00
RR. knuckles & coup.	26.00 to 26.50
Rail coil springs	26.50 to 27.00
Rail leaf springs	26.50 to 27.00
Rolled steel wheels	26.50 to 27.00
Low phos. billet crops	27.00 to 27.50
Low phos. punchings	26.00 to 26.50
Low phos. heavy plate	25.50 to 26.00
Railroad malleable	25.50 to 26.00

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$20.00
No. 2 hvy. mltng. steel	18.50
Hydraulic bund., new	20.00
Hydraulic bund., old	17.50
Steel rails for rolling	$25.00 to 26.00
Cast iron carwheels	23.00
Hvy. breakable cast	22.00 to 22.50
No. 1 cupola cast	23.50 to 24.00
Mixed yard (f'd'y) cast	20.50
Stove plate (steel wks.)	19.00 to 19.50
Railroad malleable	23.50 to 24.00
Machine shop turn	14.50
No. 1 blast furnace	14.00
Cast borings	16.50
Heavy axle turnings	19.50
No. 1 low phos. hvy.	26.00 to 26.50
Couplers & knuckles	26.00 to 26.50
Rolled steel wheels	26.00 to 26.50
Steel axles	25.00 to 25.50
Shafting	22.50
Spec. iron & steel pipe	18.00 to 18.50
Cast borings (chem.)	16.50

CHICAGO

Delivered to Chicago district consumers:

	Per Gross Ton
Hvy. mltng. steel	$19.50 to $20.00
Auto. hvy. mltng. steel alloy free	18.50 to 19.00
No. 2 auto. steel	16.25 to 16.75
Shoveling steel	19.50 to 20.00
Factory bundles	19.00 to 19.50
Dealers' bundles	17.50 to 18.00
No. 1 busheling	18.50 to 19.00
No. 2 busheling, old	11.50 to 12.00
Rolled carwheels	23.25 to 23.75
Railroad tires, cut	23.00 to 23.50
Railroad leaf springs	23.00 to 23.50
Steel coup. & knuckles	23.00 to 23.50
Axle turnings	18.75 to 19.25
Coil springs	24.00 to 24.50
Axle turn. (elec.)	19.75 to 20.00
Low phos. punchings	23.00 to 23.50
Low phos. plates 12 in. and under	22.50 to 23.00
Cast iron borings	13.50 to 14.00
Short shov. turn.	14.00 to 14.50
Machine shop turn.	13.50 to 14.00
Rerolling rails	23.00 to 23.50
Steel rails under 3 ft.	23.00 to 23.50
Steel rails under 2 ft.	23.50 to 24.00
Angle bars steel	22.50 to 23.00
Cast iron carwheels	20.50 to 21.00
Railroad malleable	24.25 to 24.75
Agric. malleable	17.50 to 18.00
	Per Net Ton
Iron car axles	$23.50 to $24.00
Steel car axles	24.00 to 24.50
Locomotive tires	18.00 to 18.50
Pipes and flues	14.00 to 14.50
No. 1 machinery cast	18.50 to 19.00
Clean auto. blocks	18.00 to 18.50
No. 1 railroad cast	17.50 to 18.00
No. 1 agric. cast	16.50 to 17.00
Stove plate	13.00 to 13.50
Grate bars	14.00 to 14.50
Brake shoes	14.25 to 14.75

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$21.50 to $22.00
No. 2 hvy. mltng. steel	20.00 to 20.50
Low phos. plate	24.50 to 25.00
No. 1 busheling	20.50 to 21.00
Hydraulic bundles	21.00 to 21.50
Machine shop turn	14.50 to 15.00

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$20.50 to $21.00
No. 2 hvy. mltng. steel	19.50 to 20.00
Comp. sheet steel	$20.00 to $20.50
Light bund. stampings	16.50 to 17.00
Drop forge flashings	19.00 to 19.50
Machine shop turn.	13.50 to 14.00
Short shov. turn.	14.00 to 14.50
No. 1 busheling	19.75 to 20.25
Steel axle turnings	20.00 to 20.50
Low phos. billet and bloom crops	25.00 to 25.50
Cast iron borings	14.00 to 14.50
Mixed bor. & turn.	14.00 to 14.50
No. 2 busheling	14.00 to 14.50
No. 1 Machinery cast	22.50 to 23.00
Railroad cast	21.50 to 22.00
Railroad grate bars	15.50 to 16.00
Stove plate	15.50 to 16.00
Rails under 3 ft.	25.50 to 26.00
Rails for rolling	25.00 to 25.50
Railroad malleable	24.00 to 24.50

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$21.00 to $21.50
No. 2 hvy. mltng. steel	19.00 to 19.50
Scrap rails	21.50 to 22.00
New hvy. b'ndled sheets	18.50 to 19.00
Old hydraul. bundles	17.00 to 17.50
Drop forge flashings	18.50 to 19.00
No. 1 busheling	18.50 to 19.00
Machine shop turn.	13.50 to 14.00
Shov. turnings	14.50 to 15.00
Mixed bor. & turn.	13.50 to 14.00
Cast iron borings	13.50 to 14.00
Knuckles & couplers	25.00 to 25.50
Coil & leaf springs	25.00 to 25.50
Rolled steel wheels	25.00 to 25.50
No. 1 machinery cast	20.50 to 21.00
No. 1 cupola cast	19.00 to 19.50
Stove plate	16.50 to 17.00
Steel rails under 3 ft.	26.50 to 27.00
Cast iron carwheels	18.50 to 19.50
Railroad malleable	23.50 to 24.00
Low phos. plate	26.50 to 27.00

ST. LOUIS

Dealers' buying prices per gross ton delivered to consumer:

Selected hvy. melting	$18.00 to $18.50
No. 1 hvy. melting	17.50 to 18.00
No. 2 hvy. melting	16.50 to 17.00
No. 1 locomotive tires	20.50 to 21.00
Misc. stand. sec. rails	21.00 to 21.50
Railroad springs	23.50 to 24.00
Bundled sheets	13.00 to 13.50
Cast bor. & turn.	11.00 to 11.50
Machine shop turn.	11.50 to 12.00
Heavy turnings	13.50 to 14.00
Rails for rerolling	23.00 to 23.50
Steel car axles	25.00 to 25.50
No. 1 RR wrought	15.00 to 15.50
No. 2 RR. wrought	16.50 to 17.00
Steel rails under 3 ft.	23.00 to 23.50
Steel angle bars	21.00 to 21.50
Cast iron carwheels	21.00 to 21.50
No. 1 machinery cast	20.00 to 20.50
Railroad malleable	21.00 to 21.50
Breakable cast	17.50 to 18.00
Stove plate	15.00 to 15.50
Grate bars	14.00 to 14.50
Brake shoes	14.00 to 14.50

CINCINNATI

Dealers' buying prices per gross ton at yards:

No. 1 hvy. mltng. steel	$18.25 to $18.75
No. 2 hvy. mltng. steel	16.25 to 16.75
Scrap rails for mltng.	23.25 to 23.75
Loose sheet clippings	12.75 to 13.25
Hyd'lic bundled sheets	17.00 to 17.50
Cast iron borings	9.25 to 9.75
Machine shop turn.	10.00 to 10.50
No. 1 busheling	14.25 to 14.75
No. 2 busheling	7.75 to 8.25
Rails for rolling	24.50 to 25.00
No. 1 locomotive tires	20.25 to 20.75
Short rails	26.25 to 26.75
Cast iron carwheels	18.75 to 19.25
No. 1 machinery cast	22.25 to 22.75
No. 1 railroad cast	20.50 to 21.00
Burnt cast	12.75 to 13.25
Stove plate	12.75 to 13.25
Agricul. malleable	18.00 to 18.50
Railroad malleable	21.00 to 21.50
Mixed hvy. cast.	19.25 to 19.75

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting steel	$18.00
No. 2 hvy. melting steel	17.00
No. 1 busheling	16.00
Scrap steel rails	18.00
Steel rails under 3 ft.	20.00
Rails for rolling	19.00
Long turnings	9.50
Cast iron borings	8.50
Stove plate	12.50
Steel axles	18.00
No. 1 RR. wrought	16.00
No. 1 cast	18.00
No. 2 cast	13.00
Cast iron carwheels	19.00
Steel carwheels	18.00

DETROIT

Dealers' buying prices per gross ton, f.o.b. cars:

No. 1 heavy melting	$16.50 to $17.00
No. 2 heavy melting	15.50 to 16.00
Borings and turnings	11.50 to 12.00
Machine shop turnings	11.00 to 11.50
Long turnings	10.00 to 10.50
Short shov. turnings	12.00 to 12.50
No. 1 cast	19.50 to 20.00
Automotive cast	19.50 to 20.00
Hvy. breakable cast	16.00 to 16.50
Stove plate	11.50 to 12.00
Hydraul. comp. sheets	18.25 to 18.75
New busheling	16.50 to 17.00
Sheet clips	14.00 to 14.50
Flashings	16.50 to 17.00
Low phos. plate	19.00 to 19.50

NEW YORK

Dealers' buying prices per gross ton on cars:

No. 1 hvy. mltng. steel	$15.50 to $16.00
No. 2 hvy. mltng. steel	14.50 to 15.00
Hvy. breakable cast	18.00 to 18.50
No. 1 machinery cast	18.50 to 19.00
No. 2 cast	16.50 to 17.00
Stove plate	15.00 to 15.50
Steel car axles	23.00 to 24.00
Shafting	19.50 to 20.50
No. 1 RR wrought	17.50 to 18.00
No. 1 wrought long	17.00 to 17.50
Spec. iron & steel pipe	12.00 to 12.50
Rails for rolling	19.00 to 19.50
Clean steel turnings*	10.00 to 10.50
Cast borings*	11.00 to 11.50
No. 1 blast furnace	9.00 to 9.50
Cast borings (chem.)	11.00 to 11.50
Unprepared yard scrap	8.50 to 9.00
Light iron	6.50 to 7.00

Per gross ton delivered local foundries:

No. 1 machin. cast	$20.50 to $21.00
No. 2 cast	17.00 to 17.50

* $1.50 less for truck loads.

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars:

Breakable cast	$16.75 to $17.00
Machine shop turn.	9.00 to 10.00
Mixed bor. & turn.	8.75 to 9.75
Bun. skeleton long	13.00 to 13.25
Shafting	19.00 to 19.50
Stove plate	13.75 to 14.00
Cast bor. chemical	10.00 to 10.25

Per gross ton delivered consumers' yards:

Textile cast	$22.00 to $24.50
No. 1 machine cast	22.00 to 24.00

Per gross ton delivered dealers' yards:

No. 1 hvy. mltng. steel	$12.00
No. 2 steel	11.00

PACIFIC COAST

Per net ton delivered to consumer:

	San Fran.	Los Ang.	Seattle
No. 1 hvy. mltng. steel	Nominal		
No. 2 hvy. mltng. steel			
Bundles			

CANADA

Dealers' buying prices at these yards, per gross ton:

	Toronto	Montreal
Low phos. steel	$13.00	$12.50
No. 1 hvy. mltng. steel	11.25	10.75
No. 2 hvy. mltng. steel	10.00	9.75
Mixed dealers steel	8.75	8.25
Drop forge flashings	9.75	9.25
New loose clippings	8.75	8.25
Busheling	6.00	5.50
Scrap pipe	7.75	7.25
Steel turnings	8.00	7.50
Cast borings	8.00	7.50
Machinery cast	22.00	21.00
Dealers' cast	21.00	20.00
Stove plate	16.00	15.50

EXPORT

Dealers' buying prices per gross ton:

New York, truck lots, delivered barges	
No. 1 hvy. mltng. steel	$16.00 to $17.00
No. 2 hvy. mltng. steel	15.00 to 16.00
No. 2 cast	17.00 to 17.50
Stove plate	15.00 to 16.00
Boston on cars at Army Base or Mystic Wharf	
No. 1 hvy. mltng. steel	$17.25
No. 2 hvy. mltng. steel	16.25
Rail (scrap)	$17.25 to 17.50
Philadelphia, delivered alongside boats, Port Richmond	
No. 1 hvy. mltng. steel	Nominal
No. 2 hvy. mltng. steel	Nominal

Construction Steel

. . .STRUCTURAL STEEL, REINFORCING BARS, PLATES, PILING, ETC.

Fabricated Steel

Structural steel awards advanced to 55,750 tons from 40,100 tons last week; new projects jumped to 35,305 tons from 14,250 tons; plate awards total 12,485 tons.

AWARDS

NORTH ATLANTIC STATES

1600 Tons, various locations, hangars for U. S. Engineers, to an unnamed fabricator.

1125 Tons, Portland, Me., State bridge, to Phoenix Bridge Co., Phoenixville, Pa., and Bethlehem Steel Co., Bethlehem, Pa., through Wyman & Simpson, Inc., Augusta, Me., contractor.

1000 Tons, State of New York, tunnel lining for Delaware Aqueduct, contract No. 313, to Bethlehem Steel Co., Bethlehem, Pa.

850 Tons, Hartford, Conn., extension for light company, to Bethlehem Fabricators, Inc., Bethlehem, Pa.

700 Tons, Pittsburgh, building extension for Pittsburgh Bridge & Iron Co., to Pittsburgh Bridge & Iron Co., Pittsburgh.

670 Tons, Pittsburgh, 108 transmission towers for Monongahela-West Penn Public Service Co., to Bethlehem Steel Co., Bethlehem, Pa.

550 Tons, Aberdeen, Md., twelve buildings for Government, to Belmont Iron Works, Philadelphia.

500 Tons, Philadelphia, addition to structural assembly shop for Philadelphia Navy Yard, to Bethlehem Steel Co., Bethlehem, Pa.

450 Tons, Deans, N. J., State highway bridge, route 29, section 33-A, to American Bridge Co., Pittsburgh.

360 Tons, Pittsfield, Mass., General Electric Co., 225 tons for office and laboratory, 125 tons for crane runway, to Lehigh Structural Steel Co., Allentown, Pa.

360 Tons, Leicester, N. Y., State bridge FAGH-RC-40-32, to American Bridge Co., Pittsburgh.

350 Tons, Norwood, Mass., Winslow Bros. & Smith Co., storage building, to A. O. Wilson Structural Co., Cambridge, Mass.

350 Tons, Aberdeen, Md., three buildings for Government, to Dietrich Bros., Baltimore.

250 Tons, North Tonawanda, N. Y., crane runway for Buffalo Bolt Co., to Buffalo Structural Steel Co.

245 Tons, Westfield, Mass., Stevens Paper Mill, to Standard Structural Steel Co., Hartford, Conn.

215 Tons, Trenton, N. J., DeLaval Steam Turbine Co. building, to Bethlehem Fabricators, Inc., Bethlehem, Pa.

185 Tons, Painted Post, N. Y., factory addition for Ingersoll-Rand Co., to American Bridge Co., Pittsburgh.

100 Tons, Reading, Pa., addition to manufacturing building, Parish Pressed Steel Co., to Reading Steel Products Co., Reading.

THE SOUTH

30,000 Tons, Charleston, W. Va., Naval ordnance plant, to American Bridge Co., Pittsburgh.

1600 Tons, Tellico Plains, Tenn., transmission towers for TVA, to American Bridge Co., Pittsburgh.

800 Tons, Watts Bar, Tenn., hydro-electric plant for TVA, to Midland Structural Steel Co., Cicero, Ill.

250 Tons, Nashville, Tenn., hangar, to Nashville Bridge Co., Nashville.

CENTRAL STATES

3400 Tons, additional, Wilmington, Ill., heavy framing for Elwood ordnance plant, to Wisconsin Bridge & Iron Co., Milwaukee, Wis.

3000 Tons, Ravenna, Ohio, 58 buildings for shell loading plant, to Bethlehem Steel Co., Bethlehem, Pa.

1200 Tons, St. Louis County, Mo., highway bridge, Warson and Clayton Roads, to Stupp Brothers Bridge & Iron Co., St. Louis.

765 Tons, Cleveland, airport hangar, to American Bridge Co., Pittsburgh.

700 Tons, Hamilton, Ohio, general machinery building, to William Lang & Sons Co., Cincinnati.

600 Tons, Ravenna, Ohio, three inert storage buildings, 200 tons to Burger Iron Co., Akron, Ohio; 200 tons to Pittsburgh Bridge & Iron Co., Pittsburgh; 200 tons to Ohio Structural Steel Co., Newton Falls, Ohio.

WESTERN STATES

2675 Tons, Bonneville, Ore., to Oregon City, Ore., transmission towers for Bonneville Administration (Invitation 1617), to Bethlehem Steel Co., San Francisco.

400 Tons, Anchorage, Alaska, six Army buildings, Alaskan Air Base (Invitation QM-6813-41-186), to Pittsburgh-Des Moines Steel Co., Des Moines, Iowa.

289 Tons, Earp, Cal., penstock gates for Parker power plant (Specification 942), to American Bridge Co., Pittsburgh.

175 Tons, Portland, Ore., telephone building, to Poole & McGonigle, Portland.

PENDING STRUCTURAL PROJECTS

NORTH ATLANTIC STATES

450 Tons, Niagara Falls, N. Y., two factory buildings for International Graphite Co.; bids in.

365 Tons, Farmingdale, N. Y., building for Liberty Aircraft Products Corp.

300 Tons, New Haven, Conn., two buildings for Adley Express Co.

240 Tons, Newark, N. J., building for Paramount Realty Co.

220 Tons, Lackawack, N. Y., rock crushing plant for city of New York.

140 Tons, Niagara Falls, N. Y., plant addition for Niacet Chemical Co.; bids in.

125 Tons, Warren County, Pa., highway bridge; bids Jan. 24.

120 Tons, Scranton, Pa., Lackawanna Avenue bridge; Pine Brook Iron Works, Scranton, low bidder.

100 Tons, Manchester, N. H., Government hangar.

100 Tons, Bangor, Me., Government hangar.

THE SOUTH

5000 Tons, Tulsa, Okla., airplane factory.

165 Tons, Tucker County, W. Va., beam spans for State.

CENTRAL STATES

6000 Tons, Kansas City, Kan., airplane factory; bids taken Jan. 22.

4000 Tons, South Bend, Ind., aircraft engine plant for Studebaker Corp.

3000 Tons, Chicago, aircraft parts plant for Studebaker Corp.

1800 Tons, Robertson, Mo., Minneapolis, Minn., and Gross Ile, Mich., hangars, etc., for Navy Department.

1200 Tons, Fort Wayne, Ind., aircraft gear plant for Studebaker Corp.

800 Tons, Fort Wayne, Ind., motor supply warehouse for Government.

400 Tons, Monsanto, Mo., chemical factory for Monsanto Chemical Co., for defense work; bids Feb. 22.

WESTERN STATES

10,000 Tons or more, Oakland, Cal., Army piers and warehouses; sites acquired.

500 Tons, San Francisco, United Airlines terminal at Mills Field; bids to city Feb. 4. Project previously reported without bid date.

400 Tons, Bremerton, Wash., Navy Yard warehouse (Specification 10,240); H.R. Olson, Tacoma, Wash., contractor.

400 Tons, San Diego, Cal., store building for S. H. Kress & Co.

100 Tons, Oakland, Cal., Gaylord Container Corp. plant.

FABRICATED PLATES

AWARDS

6500 Tons, Coram, Cal., Shasta Dam penstocks (Specification 941), to Western pipe & Steel Co., San Francisco.

4000 Tons, various locations, pez top buoys for Navy Department, to Bethlehem Steel Co., Bethlehem, Pa.

1050 Tons, Quonset Point, R. I., 62 gasoline tanks for Naval Station, to Eastern Steel Tank Co., Brooklyn.

700 Tons, Pittsburgh, three barges for Iron City Sand & Gravel and two barges for George Vang, Inc., to Hunter Steel Division of Pittsburgh Coke & Iron Co., Pittsburgh.

235 Tons, Decatur, Ala., oil barge for Independent Oil Co., to Ingalls Iron Works Co., Birmingham.

PENDING PROJECTS

400 Tons, Tuscon, Ariz., elevated water tank at municipal airport; bids Jan. 27. Tonnage includes shapes.

SHEET PILING

AWARDS

360 Tons, St. Louis, Lindbergh Boulevard bridge, to Bethlehem Steel Co., Bethlehem, Pa.

Weekly Bookings of Construction Steel

Week Ended ——→	Jan. 21, 1941	Jan. 14, 1941	Dec. 23, 1940	Jan. 23, 1940	Year to Date 1941	Year to Date 1940
Fabricated structural steel awards	55,750	40,100	34,100	10,450	129,750	34,700
Fabricated plate awards	12,485	0	4,000	16,750	13,985	17,290
Steel sheet piling awards	540	105	10,505	0	2,300	250
Reinforcing bar awards	10,015	4,900	16,600	7,000	28,960	18,065
Total Letting of Construction Steel	78,790	45,105	65,205	34,200	174,995	70,305

180 **Tons,** St. Louis, Lindbergh Boulevard bridge, to Truscon Steel Co., Youngstown.

PENDING PROJECTS

700 **Tons,** Cleveland, contract No. 35, Cuyahoga River improvement; bids Jan. 23.
395 **Tons,** Paducah, Ky., flood prevention work, for U. S. Engineer's Office, Louisville Ky.

Reinforcing Steel

Awards of 10,015 tons; 22,680 tons in new projects.

AWARDS

ATLANTIC STATES

200 **Tons,** Venango County, Pa., bars and mesh for route 90, section 4, to Truscon Steel Co., Youngstown, through Baldwin Brothers, contractors.
175 **Tons,** Syracuse, N. Y., Woolworth store, to Truscon Steel Co., Youngstown, through F. W. O'Connell.
166 **Tons,** Schenectady, N. Y., order and store building for General Electric Co., to Truscon Steel Co., Youngstown, through James Stewart & Co.
150 **Tons,** State of Connecticut, State road, to Concrete Steel Co., Boston.
145 **Tons,** Point Judith, R. I., War Department supplies, to Charles A. Lewis Co., Springfield, Mass.

SOUTH AND CENTRAL

2650 **Tons,** Columbus, Ohio, quartermaster warehouse, to Jones & Laughlin Steel Corp., Pittsburgh, through Fireproof Products Co., New York; Corbetta Construction Co., New York, contractor.
2500 **Tons,** Madison, Ind., Army proving ground, to Laclede Steel Co., St. Louis; J. L. Simmons Co., Indianapolis, and J. C. O'Connor & Son, Inc., Fort Wayne, contractors.
1200 **Tons,** Martinsville, Va., du Pont nylon plant, to Bethlehem Steel Co., Bethlehem, Pa., through Virginia Steel Co.
450 **Tons,** Chicago, Ill., subway section S-10-E, to Olney J. Dean Steel Co., Cicero, Ill.
250 **Tons,** Peoria, Ill., retaining walls and sewers, to Calumet Steel Co., Chicago Heights, Ill.; States Improvement Co., contractor.
215 **Tons,** Marion County, Ind., highway bridge No. 2093, to Inland Steel Co., Chicago, through W. J. Holliday; Smith & Johnson, contractors.
211 **Tons,** Indianapolis, bridge 2093, to W. J. Holliday & Co., Indianapolis.
200 **Tons,** Chicago, Ill., subway, section S-10-D, to Olney J. Dean Steel Co., Cicero, Ill.
175 **Tons,** Chicago, Commonwealth Edison Co. coal plant, to Bethlehem Steel Co., Bethlehem, Pa.
150 **Tons,** St. Louis, Sears-Roebuck & Co. store, to Sheffield Steel Co., Kansas City.
117 **Tons,** Serena, Ill., bridge, to Sheffield Steel Co., Kansas City.

WESTERN STATES

475 **Tons,** Earp, Cal., Parker power plant (Invitation A-44,201-A), to Columbia Steel Co., San Francisco.
185 **Tons,** Los Angeles, Cedars of Lebanon hospital out-patients building, to Blue Diamond Corp., Los Angeles.
170 **Tons,** Corbett, Wyo., Bureau of Reclamation, to Laclede Steel Co., St. Louis.
125 **Tons,** Camp Clayton, Cal., military buildings, to Soule Steel Co., San Francisco.
104 **Tons,** Spokane, remodeling post office, to Paper Calmenson Co., St. Paul, Minn., through James Leck Co., Minneapolis, general contractor.

PENDING REINFORCING BAR PROJECTS

ATLANTIC STATES

700 **Tons,** Chester, Pa., William Penn homes (second unit); Stofflet & Tillotson, contractors.
600 **Tons,** Pittsburgh, River Front boulevard, contract No. 10; bids Jan. 28.
500 **Tons,** Jamaica Plain, Mass., housing project; John Bowen Co., Boston, contractor.
500 **Tons,** Hartford, Conn., housing project.
200 **Tons,** Providence, R. I., Brown University buildings.

SOUTH AND CENTRAL

2500 **Tons,** Wilmington, Ill., Elwood ordnance plant; Sanderson & Porter, contractors.
1000 **Tons,** Monsanto, Ill., chemical plant.
500 **Tons,** Near Rolla, Mo., Fort Leonard Wood cantonment; 7th Corps Area contractor.
400 **Tons,** Paducah, Ky., flood prevention work, for U. S. Engineer's Office, Louisville, Ky.
300 **Tons,** Ogallala, Neb., Kingsley Dam.
200 **Tons,** Chicago, Rheem Mfg. Co. plant.
100 **Tons,** Chicago, Leiter Estate store building.

WESTERN STATES

177 **Tons,** Coram, Cal., Shasta power plant (Invitation A-33,109-A-2); bids in.

PUERTO RICA

15,000 **Tons,** Puerto Rico, Borinquen Field air base; McCloskey & Co., contractors.

Pipe Lines

Consumers Power Co., Jackson, Mich., plans new 12-in. welded steel pipe line from recently located gas field in Missaukee, Osceola and Clare Counties to point near Midland, Mich., about 38 miles, for natural gas transmission. Connection will be made with main line at latter point. Work is scheduled to begin soon.

Gladewater Refining Co., Gladewater, Tex., plans new 10-in. pressure pipe line from point near Hawkins, Tex., to oil refinery in that district, about 14 miles, for crude oil transmission for service at refinery. Cost close to $80,000.

Pine Mountain Fuel Gas Corp., Middlesboro, Ky., plans new welded steel pipe line from gas properties in Knox County, Ky., to city, for natural gas transmission for local distribution. Also will install pipe line distribution system, with control station, service connections and other facilities. Cost about $250,000.

King County Water District No. 49, Burien, Wash., D. H. Salter, secretary, plans about three miles of 4 and 6-in. steel pipe for water system near Lake Burien. Edward F. Hughes, County-City Building, Seattle, is consulting engineer.

Flagstaff, Ariz., has low bid from Williams & Van Valkenburgh, 8609 San Vicente Avenue, South Gate, Cal., at $153,267 for 12-in. welded steel pipe line from Lake Mary to water treatment plant and thence to connection with present city mains, 45,000 ft., in all.

Southern Gas Co., Longview, Tex., Roger Lacy, president, plans extensions in welded steel pipe line system to Mineola, Grand Saline, Wills Point and Terrell, Tex., for natural gas transmission for distribution in respective municipalities; also installation of distribution systems at places noted, with control stations, meter houses, service connections and other operating facilities. Other welded steel pipes for natural gas transmission are planned to Marshall, Tex., and to point near Dallas, Tex., respectively, where gas will be furnished for commercial service. Entire project to cost over $400,000.

Cast Iron Pipe

Ottumwa, Iowa, plans extensions in water pipe lines, including about 650 ft. of 6-in., and 4250 ft. of 2-in.; also other waterworks installation. Cost about $42,000. Financing has been arranged through Federal aid.

Board of Redford Township Commissioners, near Detroit, care of Hubbell, Roth & Clark, Inc., Buhl Building, Detroit, consulting engineer, plans pipe line extensions in water system. Fund of about $350,000 will be expended for this and new sewage lines.

Board of District Commissioners, District Building, Washington, closes bids Feb. 7 for 36-in. line from Fourth and L Streets, N. E., to Eleventh and East Capitol Streets; 24 and 30-in. lines from West Virginia Avenue and L Street, N. E., to Benning Road, N. E., near Fifteenth Street; and 20-in. line from Eleventh and B Streets, N. E., to Tennessee Avenue and E Street, N. E. Alternate bids to be received in each case on cast iron, steel or concrete pipe.

Monroe, Wis., plans pipe line extensions in water system and other waterworks installation. Estimates of cost will be made soon.

Chandler, Ariz., plans about 8000 ft., various sizes, for water system. Financing has been arranged through Federal aid and work will begin soon.

Nelsonville, Ohio, has concluded financing through Federal aid for pipe line extensions in water system, including main line from new water source to be developed on Hocking River, and will begin work soon; also for complete water treatment and water-softening plant, and other waterworks installation. Cost about $210,000. Burgess & Niple, 568 East Broad Street, Columbus, Ohio, are consulting engineers.

Glasco, Kan., plans about 11,300 ft. of 6-in. for water system, and other waterworks installation. Will begin work in February. Financing is being arranged through Federal aid. Cost close to $25,000. Paulette & Wilson, Public Utilities Building, Salina, Kan., are consulting engineers.

East Brainerd Utility District, Chattanooga, Tenn., plans pipe line extensions in water system and other waterworks installation. Cost about $200,000. J. B. McCrary Engineering Co., Marietta Street Building, Atlanta, Ga., is consulting engineer.

Ventura, Cal., will take bids Jan. 27 on 120 tons of 10-in. pipe.

Trade Notes

Geometric Tool Co., New Haven, Conn., announces that its products are being handled in Western Pennsylvania, Southeastern Ohio and Northwestern West Virginia by the Penn General Supply Co., 101-103 Market Street, Pittsburgh.

●

Doehler Die Casting Co., New York, announces that in response to substantially increased demands for its products for national defense it will build additions immediately to its Pottstown, Pa., and Batavia, N. Y., plants, to increase its facilities for the manufacture of die castings in zinc, aluminum, brass and magnesium alloys.

●

Gisholt Machine Co., Madison, Wis., has announced the reopening of its Northern works, also located in Madison, in order to meet the current demands of the defense program for turret lathes. This expansion, for production of Gisholt turret lathes, adds 60,000 sq. ft. to the present manufacturing facilities. It is planned that operations will start in this plant by May 1. Work has already started on reconditioning the building, last used in 1930. This expansion of manufacturing facilities supplements several substantial additions to production capacity made in the past year.

●

Eutectic Welding Alloys, Inc., 40 Worth Street, New York, has recently been organized to manufacture Castolin low temperature welding and brazing alloys, formerly imported from Switzerland and sold through the Park Sales Co., New York. Several varieties of Castolin are made. Castolin No. 14 is for cast iron; No. 16 is for brazing high speed steel, tungsten carbide, malleable alloys, while Castolin No. 190 is a low melting alloy for joining aluminum.

●

Contracts for an addition to their plant and office building have just been awarded by the Blackner Pump Co., at Grand Rapids, Mich., according to an announcement by N. J. Harkness, executive vice-president.

●

Sparkes & Shore Mfg. Co., Inc., 36-20 Thirty-fourth Street, Long Island City, N. Y., manufacturer of light steel stampings, has changed its name to R. W. Shore Mfg. Co., Inc.

●

American Burr & Gear Co., Milwaukee, has been organized to design and build mechanical products and machinery with a capital of 100 shares of common stock, no par value, by Robert C. Fink, Catherine Burgett and Gregory Gramling.

●

Charles Hardy, Inc., and the Hardy Metallurgical Co. have moved their executive offices from 415 Lexington Avenue to the Graybar Building, 420 Lexington Avenue, New York.

Prices of Finished Iron and Steel...

Steel prices on these pages are f.o.b. basing points (in cents per lb.) unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, deductions, and in most cases freight absorbed to meet competition.

Basing Point → / ↓ Product	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	Pacific Ports, Cars	DELIVERED TO Detroit	New York	Philadelphia
SHEETS															
Hot rolled	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.20¢	2.34¢	2.27¢
Cold rolled[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized (24 ga.)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.74¢	3.67¢
Enameling (20 ga.)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	
Long ternes[2]	3.80¢		3.80¢									4.55¢			
Wrought iron	4.75¢														
STRIP															
Hot rolled[3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢		
Cold rolled[4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester = 3.00¢)					2.90¢		
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢								
Commodity C-R	2.95¢			2.95¢			2.95¢	(Worcester = 3.35¢)					3.05¢		
TIN PLATE Standard cokes (Per 100-lb. base box)	$5.00	$5.00	$5.00						$5.10						
BLACK PLATE 29 gage[5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢ ([10])			
TERNES, M'FG. Special coated (Per base box)	$4.30		$4.30						$4.40						
BARS															
Carbon steel	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth = 2.25¢)			2.50¢	2.80¢	2.25¢	2.49¢	2.47¢
Rail steel[6]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.50¢	2.80¢			
Reinforcing (billet)[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢	2.25¢		
Reinforcing (rail)[7]	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢				2.40¢	2.45¢	2.15¢		
Cold finished[8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢							2.70¢		
PLATES															
Carbon steel	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	(Coatesville and Claymont = 2.10¢)		2.45¢	2.65¢		2.29¢	2.15¢
Wrought iron	3.80¢														
Floor plates	3.35¢	3.35¢									3.70¢	4.00¢		3.71¢	
Alloy	3.50¢	3.50¢			(Coatesville = 3.50¢)										
SHAPES Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢		(Bethlehem = 2.10¢)			2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL C-R															
0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester = 3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester = 4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester = 6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester = 8.55¢)								
WIRE[9]															
Bright	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)								
Galvanized	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)								
Spring	3.20¢	3.20¢		3.20¢			(Worcester = 3.30¢)								
PILING Steel sheet	2.40¢	2.40¢				2.40¢						2.95¢			
IRON BARS Common		2.25¢			(Terre Haute, Ind. = 2.15¢)										
Refined	3.75¢														
Wrought	4.40¢														

[1] Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base. [2] Unassorted 8-lb. coating. [3] Widths up to 12 in. [4] Carbon 0.25 per cent and less. [5] Applies to 29 gage within certain width and length limitations. [6] For merchant trade. [7] Straight lengths as quoted by distributers. [8] Also shafting. For quantities of 20,000 to 39,999 lb. [9] Carload lots to manufacturing trade. [10] Boxed.

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (Rerolling only). Prices delivered Detroit are $2 higher f.o.b. Duluth, billets only, $2 higher.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00

Shell Steel

Basic open hearth shell steel f.o.b. Pittsburgh and Chicago.

	Per Gross Ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting to length, or quantity. This type of steel is for hot rolled sections used for the forging of shells and includes rounds, round squares, and special sections.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(No. 5 to 9/32 in.)	*Per Lb.*
Pittsburgh, Chicago, Cleveland	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.50c.
Galveston	2.25c.

9/32 in. to 4/64 in., $3 a net ton higher. Quantity extras apply.

ROOFING TERNE PLATE

(F.o.b. Pittsburgh; Package, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00
25-lb. coating I.C.	8.00	16.00
30-lb. coating I.C.	8.63	17.25
40-lb. coating I.C.	9.75	19.50

WIRE PRODUCTS

(To the Trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham)

	Base per Keg
Standard wire nails	$2.55
Coated nails	2.55
Cut nails, carloads	3.85
	Base per 100 Lb.
Annealed fence wire	$3.05
	Base Column
Woven wire fence*	67
Fence posts (carloads)	69
Single loop bale ties	56
Galvanized barbed wire†	70
Twisted barbless wire	70

*15½ gage and heavier. †On 80-rod spools in carload quantities.

Note: Birmingham base same on above items, except spring wire.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine and carriage bolts:	
½ in. and smaller by 6 in. and shorter	68
9/16 and ⅝ in. by 6 in. and shorter	66
¾ to 1 in. by 6 in. and shorter	64
1⅛ in. and larger, all lengths	62
All diameters over 6 in. long	62
Lag, all sizes	65
Plow bolts	68½
Hot pressed nuts; c.p.c., t-nuts; square, hex., blank or tapped:	
½ in. and smaller	66
9/16 to 1 in. inclusive	63
1⅛ to 1½ in. inclusive	61
1⅝ in. and larger	60

On above items, excepting plow bolts, additional allowance of 10 per cent for full container quantities.

On all of the above items there is an additional 5 per cent allowance for carload shipments.

Semi-fin. hexagon nuts	U.S.S.	S.A.E.
½ in. and smaller	66	70
9/16 to 1 in.	63	65
1⅛ in. through 1½ in.	61	62
1⅝ in. and larger	60	

In full container lots, 10 per cent additional discount.

Stove bolts, packages, nuts loose	73 and 100
Stove bolts in packages, with nuts attached	73
Stove bolts in bulk	81

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago, New York, lots of 200 lb. or over.

Large Rivets

(½ in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$3.40

Small Rivets

(7/16 in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	65 and 10

Cap and Set Screws

	Per Cent Off List
Milled hexagon head, cap screws, 1 in. dia. and smaller	50
Milled headless set screws, cut thread ¼ in. and larger	64
3/16 in. and smaller	73
Upset hex. head cap screws U.S.S. or S.A.E. thread 1 in. and smaller	68
Upset set screws, cup and oval points	74
Milled studs	52

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

NON-FERROUS PRICES

Cents per lb. for early delivery

	Jan. 15	Jan. 16	Jan. 17	Jan. 18	Jan. 20	Jan 21
Copper, Electrolytic[1]	12.00	12.00	12.00	12.00	12.00	12.00
Copper, Lake	12.00	12.00	12.00	12.00	12.00	12.00
Tin, Straits, New York	50.15	50.15	50.15	....	50.15	50.15
Zinc, East St. Louis	7.25	7.25	7.25	7.25	7.25	7.25
Lead, St. Louis[3]	5.35	5.35	5.35	5.35	5.35	5.35

[1] Mine producers' quotations only, delivered Conn. Valley. Deduct ¼c. for approximate New York delivery price. [2] Add 0.39c. for New York delivery. [3] Add 0.15c. for New York delivery.

Warehouse Products

Cents per lb., Delivered

	New York	Cleveland
Tin		
Straits pig	51.25	53.75
Copper		
Electro	12.75	13.50
Castings	12.50	13.00
H. R. Sheets*	20.12	20.12
Seamless tubes*	20.62	20.62
Brass		
Yellow sheets*	18.65	18.65
Yellow, rods*	13.67	13.67
Seamless tubes*	21.40	21.40
Zinc		
Slabs	Nom'al	Nom'al
Sheet, No. 9 casks	13.50	Nom'al
Lead		
American pig	6.50	6.00
Bar	8.45	8.50
Cut sheets	8.80	8.75
Antimony		
Asiatic	16.00	17.00
Aluminum		
Virgin, 99%	20.00	21.00
No. 1 remelt., 98-99%	18.00	18.50
Solder		
½ and ½	30.750	32.00
Babbitt		
Anti-friction grade	23.50	21.50

Old Metals

Cents per lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators. Selling prices are those charged to consumers after the metal has been prepared for their use.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper		
Hvy. crucible	10.00	10.625
Hvy. and wire	9.00	9.40
Light and bottoms	8.00	8.50
Brass		
Heavy	5.750	6.255
Light	4.750	5.50
No. 1 yel. turn	5.50	6.50
No. 1 red or compo. turnings	9.00	10.00
Hvy. Mach. compo.	9.25	9.625
Lead		
Heavy	4.50	5.00
Aluminum		
Cast	12.00	13.00
Sheet	14.75	15.75
Zinc	5.50	5.75

Miscellaneous Non-Ferrous Prices

ALUMINUM, delivered: virgin, 99 per cent plus, 17c.-18c. a lb.; No. 12 remelt No. 2, standard, 17-17.50c. a lb. NICKEL electrolytic, 35c.-36c. a lb. base refinery, lots of 2 tons or more. ANTIMONY, prompt: Asiatic, 16.50c. a lb., New York; American, 13c. a lb., f.o.b. smelter. QUICKSILVER, $164-$166 per flask of 76 lb. BRASS INGOTS, commercial 85-5-5-5, 13.25c. a lb.

*These prices, which are also for delivery from Chicago warehouses, are quoted with the following percentages allowed off for extras; on copper sheets, 33⅓; on brass sheets and rods, 40; on brass tubes, 33⅓, and copper tubes, 40.

ALLOY STEEL

Alloy Steel Blooms, Billets and Slabs

Base per gross ton, f.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo or Bethlehem $54.00

Alloy Steel Bars

Base per pound, f.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.

Open-hearth grade ..... 2.70c.
Delivered, Detroit ..... 2.80c.

S.A.E. Series Numbers	Alloy Differential, per 100 Lb.
2000 (1.5 Ni)	$0.35
2100 (1.5 Ni)	0.75
2300 (3.5 Ni)	1.70
2500 (5 Ni)	2.55
3100 Ni-Cr	0.70
3200 Ni-Cr	1.35
3300 Ni-Cr	3.80
3400 Ni-Cr	3.20
4100 Cr-Mo (0.15 to 0.25 Mo.)	0.55
4100 Cr-Mo (0.25 to 0.40 Mo.)	0.75
x4340 Cr-Ni-Mo	1.70
4340 Cr-Ni-Mo	1.85
4600 Ni-Mo (0.2-0.3 Mo, 1.5-2 Ni)	1.20
5100 (0.60-0.90 Cr)	0.35
5100 (0.80-1.10 Cr)	0.45
5100 Cr spring steel	0.15
52-100 Cr. (electric furnace)	2.60
6100 Cr-V bar	1.20
6100 Cr-V spring steel	0.85
C-V	0.85

The above differentials are for hot rolled finished products. The differential for most grades in electric furnace steel is 50c. higher. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base.

Alloy Cold-Finished Bars

Base per pound, f.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.35c. Delivered Detroit, 3.45c. carlots.

Alloy Steel Plates

Base per lb., f.o.b. Pittsburgh, Chicago and Coatesville.

Open hearth grade ..... 3.50c.

STAINLESS AND HEAT-RESISTANT ALLOYS

(Base prices, cents per lb., f.o.b. Pittsburgh)

Chromium-Nickel

No.	304	302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium

No.	410	430	442	446
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
H'tstrip	17.00c.	17.50c.	24.00c.	35.00c.
C'ld st.	22.00c.	22.50c.	32.00c.	52.00c.

TOOL STEEL

(F.o.b. Pittsburgh)

	Base per Lb.
High speed	67c.
High-carbon-chromium	43c.
Oil-hardening	24c.
Special	22c.
Extra	18c.
Regular	14c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 3c. a lb. higher.

ELECTRICAL SHEETS

(F.o.b. Pittsburgh)

	Base per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

Silicon strip in coils—Sheet price plus silicon sheet extra width extra plus 25c. per 100 lb. for coils. Pacific ports add 70c. a 100 lb.

CAST IRON WATER PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$54.80
6-in. and larger, del'd New York	52.20
6-in. and larger, Birmingham	46.00
6-in. and larger f.o.b. dock, San Francisco or Los Angeles or Seattle	56.00

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is $45 at Birmingham and $53.80 delivered Chicago.

SINGLE-LEG GANTRY CRANES
RELIEVE
Overhead Cranes

Courtesy Pratt & Whitney

PROVIDE EFFICIENT HANDLING SERVICE FOR LOCAL WORK

In many plants the heavy overhead cranes are often held up for long periods by light local handling jobs—such as assembling the various parts of a machine-tool.

With one or more Cleveland Tramrail Single-leg Gantry Cranes operating underneath, the overhead cranes are relieved of this work, and are free to handle the heavy completed machines and other heavy loads.

Single-leg Gantry Cranes greatly reduce waiting time and cut production delays. They are available for hand or electric operation in capacities up to 5 tons.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
1115 E. 283rd St. Wickliffe, Ohio

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT
Other products: CLEVELAND CRANES and STEELWELD MACHINERY

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes. Minimum Wall

(Net base prices per 100 ft., f.o.b. Pittsburgh, in carload lots)

	Seamless Cold Drawn	Seamless Hot Rolled	Lap Weld, Hot Rolled
1 in. o.d.13 B.W.G.	$9.01	$7.82	....
1¼ in. o.d.13 B.W.G.	10.67	9.26	....
1½ in. o.d.13 B.W.G.	11.70	10.23	$9.72
1¾ in. o.d.13 B.W.G.	13.42	11.64	11.06
2 in. o.d.13 B.W.G.	15.03	13.04	12.38
2¼ in. o.d.13 B.W.G.	16.76	14.54	13.79
2¼ in. o.d.12 B.W.G.	18.45	16.01	15.16
2½ in. o.d.12 B.W.G.	20.21	17.54	16.58
2¾ in. o.d.12 B.W.G.	21.42	18.59	17.54
3 in. o.d.12 B.W.G.	22.48	19.50	18.35
3½ in. o.d.11 B.W.G.	28.37	24.62	23.15
4 in. o.d.10 B.W.G.	35.20	30.54	28.66
4½ in. o.d.10 B.W.G.	43.04	37.35	35.22
5 in. o.d. 9 B.W.G.	54.01	46.87	44.25
6 in. o.d. 7 B.W.G.	82.93	71.96	68.14

Extras for less carload quantities:

40,000 lb. or ft. over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb .or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought iron pipe)

Base Price = $200 Per Net Ton

Butt Weld

Steel	Black	Galv.
⅛ in.	56	36
¼ to ⅜ in.	59	43½
½ in.	63½	54
¾ in.	66½	58
1 to 3 in.	68½	60½

Wrought Iron	Black	Galv.
¼ and ⅜ in.	+9	+10
½ in.	24	6½
¾ in.	30	13
1 and 1¼ in.	34	19
1½ in.	38	21½
2 in.	37½	21

Lap Weld

Steel		
2 in.	61	52½
2½ and 3 in.	64	55½
3½ to 6 in.	66	57¼
7 and 8 in.	65	55½
9 and 10 in.	64½	55
11 and 12 in.	63½	54
Wrought Iron		
2 in.	30½	15
2½ to 3½ in.	31½	17½
4 in.	33½	21
4½ to 8 in.	32½	20
9 to 12 in.	28½	15

Butt weld, extra strong, plain ends

Steel	Black	Galv.
⅛ in.	54½	41½
¼ to ⅜ in.	56½	45½
½ in.	61½	53½
¾ in.	65½	57½
1 to 3 in.	67	60
Wrought Iron		
¼ and ⅜ in.	+10	+43
½ in.	25	9
¾ in.	31	15
1 to 2 in.	38	22½

Lap weld, extra strong, plain ends

Steel		
2 in.	59	51½
2½ and 3 in.	63	55½
3½ to 6 in.	66½	59
7 and 8 in.	65½	56
9 and 10 in.	64½	55
11 and 12 in.	63½	54
Wrought Iron		
2 in.	33½	18½
2½ to 4 in.	39	25½
4½ to 6 in.	37½	24
7 and 8 in.	38½	24½
9 to 12 in.	32	20½

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher, on all butt weld 8 in. and smaller.

LAST CALL FOR EXHIBITORS

1941

MACHINE & TOOL PROGRESS EXHIBITION

Convention Hall, Detroit

MARCH 25 to 29

Inclusive

If you are producing machines, tools or equipment needed for the defense program, you can bring them directly to the attention of the men who will buy and use them—at the 1941 Machine & Tool Progress Exhibition. Being held concurrently with the annual convention of the A.S.T.E., the timely theme of both exhibition and convention is "Education for National Defense."

At the last exhibition, more than 27,000 production executives and engineers were officially registered. Total attendance exceeded 75,000.

To date more than three-fourths of all available floor space has been reserved. However, a few booths of various sizes are still available. Booths are 10x10, 10x20, 15x20, 20x20 and 20x30 feet. If you have not already reserved space, write or wire today.

AMERICAN SOCIETY OF TOOL ENGINEERS

FORD LAMB, *Exec. Secretary*

2567 W. Grand Blvd., Detroit, Mich.

ORES

Lake Superior Ores

Delivered Lower Lake Ports

	Per Gross Ton
Old range, bessemer, 51.50%...	$4.75
Old range, non-bessemer, 51.50%	4.60
Mesaba, bessemer, 51.50%	4.60
Mesaba, non-bessemer, 51.50%.	4.45
High phosphorus, 51.50%	4.35

Foreign Ores*

C.i.f. Philadelphia or Baltimore. Exclusive of Duty

	Per Unit
Algerian, low P, Cu free, dry, 55 to 58% Fe	Nom.
Caucasian, washed, 52% Mn.	Nom.
African, Indian, 44 to 48% Mn.	50c.
African, Indian, 49 to 51% Mn.	54c.
Brazilian, 46 to 48% Mn.	50c.
Cuban, del'd, duty free, 51% Mn.	68c.

	Per Short Ton Unit
Tungsten, Chinese, Wolframite, duty paid, delivered	$23 to $24
Tungsten, domestic, scheelite, delivered	$23.00
Chrome ore, lump c.i.f. Atlantic Seaboard, per gross ton: South African (low grade)	Nom.
Rhodesian, 45%	$23.50
Rhodesian, 48%	27.50

RAILS, TRACK SUPPLIES

F.o.b. Mill

Standard rails, heavier than 60 lb., gross ton	$40.00
Angle bars, 100 lb.	2.70

F.o.b. Basing Points

Light rails (from billets), gross ton	$40.00
Light rails (from rail steel), gross ton	39.00

	Base per l.b.
Cut spikes	3.00c.
Screw spikes	4.55c.
Tie plates, steel	2.15c.
Tie plates, Pacific Coast	2.30c.
Track bolts, steam railroads	4.15c.
Track bolts, discount to jobbers all sizes (per 100 counts)	65-5

Basing points, light rails—Pittsburgh, Chicago, Birmingham; spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minneaqua, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo; spikes alone—Youngstown, Lebanon, Pa., Richmond, Va.

FLUORSPAR *Per Net Ton*

Domestic washed gravel, 85-5 f.o.b. Kentucky and Illinois mines, all rail	$20.00 to $21.00
Domestic, f.o.b. Ohio River landing barges	20.00 to 21.00
No. 2 lump, 85-5 f.o.b. Kentucky and Illinois mines	20.00 to 21.00
Foreign, 85% calcium fluoride, not over 5% Si., c.i.f. Atlantic ports, duty paid	Nominal
Domestic No. 1 ground bulk, 96 to 98%, calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	31.00
As above, in bags, f.o.b. same mines	32.60

REFRACTORIES

Fire Clay Brick	*Per 1000 f.o.b. Works*
Super-duty brick at St. Louis	$60.80
First quality Pennsylvania, Maryland, Kentucky, Missouri and Illinois	47.50
First quality, New Jersey	52.50
Second quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois	42.75
Second quality, New Jersey	49.00
No. 1 Ohio	39.90
Ground fire clay, per ton	7.10

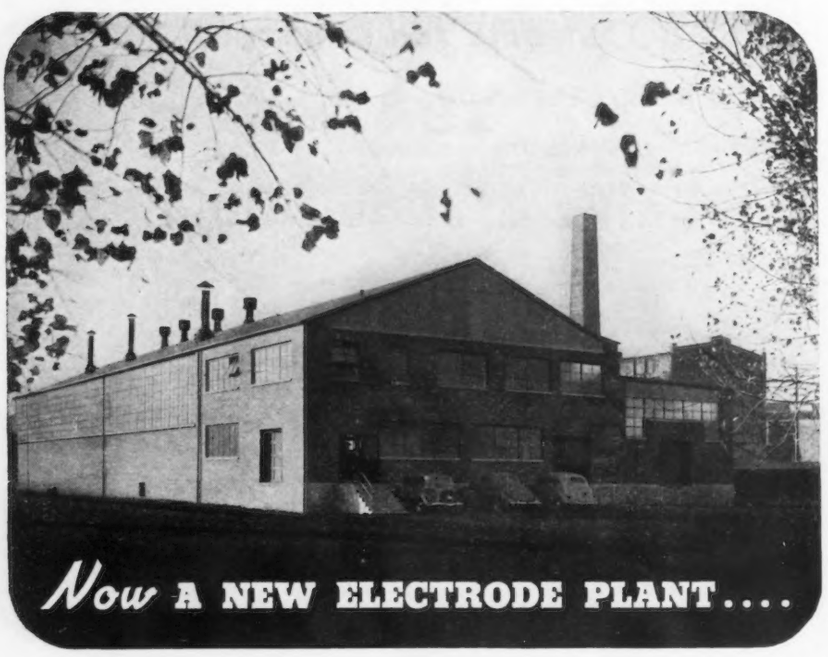
Silica Brick	
Pennsylvania	$47.50
Chicago District	55.10
Birmingham	47.50
Silica cement, net ton (Eastern)	8.55

Chrome Brick	*Net per Ton*
Standard f.o.b. Baltimore, Plymouth Meeting and Chester	$50.00
Chemically bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	

Magnesite Brick	
Standard f.o.b. Baltimore and Chester	$72.00
Chemically bonded, f.o.b. Baltimore	61.00

Grain Magnesite	
Imported, f.o.b. Baltimore and Chester, Pa. (in sacks)	(—)*
Domestic, f.o.b. Baltimore and Chester in sacks	$40.00
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

*None available.



TO GIVE YOU BETTER SERVICE

This entirely new electrode plant, devoted exclusively to the production of Murex Heavy Coated Electrodes, is now operating at East Chicago, Ind.

Designed and built expressly for the manufacture of arc welding electrodes, this up-to-the-minute factory is equipped with the most modern facilities available for the efficient production of electrodes of high quality and absolute uniformity. Its operation supplements that of the original Murex plant at Jersey City, N. J., and more than doubles the output of Murex.

Located close to sources of raw materials and in the heart of the busy mid-western industrial area, the new plant with the additional production capacity it provides, assures better service and more prompt deliveries to Murex customers throughout the country.

MUREX
METAL & THERMIT CORPORATION, 120 B'WAY, N. Y.
ALBANY CHICAGO PITTSBURGH SO. SAN FRANCISCO TORONTO

HEAVY COATED Electrodes

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

	Per Gross Ton
Domestic, 80% (carload)	$120.00

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$36.00
Domestic, 26 to 28%	49.50

Electric Ferrosilicon

Per Gross Ton, Delivered, Lump Size

50% (carload lots, bulk)	$74.50*
50% (ton lots, packed)	87.00*
75% (carload lots, bulk)	135.00*
75% (ton lots, packed)	151.00*

Bessemer Ferrosilicon

Per Gross Ton, F.o.b. Jackson, Ohio

10.00 to 10.50%	$34.50

For each additional 0.50% silicon up to 12%, 50c. per ton is added. Above 12% add 75c. per ton.

For each unit of manganese over 2% $1 per ton additional.

Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Silvery Iron

Per Gross Ton, F.o.b. Jackson, Ohio

5.00 to 5.50%	$28.50

For each additional 0.5% silicon up to 12%, 50c. a ton is added. Above 12% add 75c. a ton.

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Manganese, each unit over 2%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

Ferrochrome

Per Lb. Contained Cr., Delivered Carlots Lump Size, on Contract

4 to 6% carbon	11.00c.
2% carbon	17.50c.
1% carbon	18.50c.
0.10% carbon	20.50c.
0.06% carbon	21.00c.

Spot prices are ¼c. per lb. of contained chromium higher.

Silico-Manganese

Per Gross Ton, Delivered, Lump Size, Bulk, on Contract

3% carbon	$113.00*
2.50% carbon	118.00*
2% carbon	123.00*
1% carbon	133.00*

Other Ferroalloys

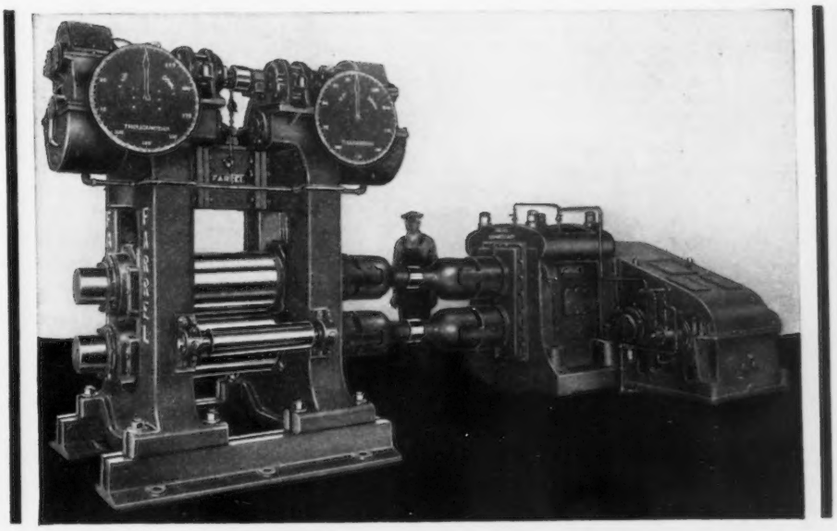
Ferrotungsten, per lb. contained W, del. carload	$2.00
Ferrotungsten, 100 lb. and less	2.25
Ferrovanadium, contract, per lb. contained V, del'd	$2.70 to $2.90†
Ferrocolumbium, per lb. contained columbium, f.o.b. Niagara Falls, N. Y., ton lots	$2.25†
Ferrocarbontitanium, 15 to 18% Ti, 7 to 8% C, f.o.b. furnace, carload and contract, per net ton	$142.50
Ferrocarbontitanium, 17 to 20% Ti, 3 to 5% C, f.o.b. furnace, carload and contract per net ton	$157.50

*Spot prices are $5 per ton higher.
†Spot prices are 10c. per lb. of contained element higher.

Ferrophosphorus, electric or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with $3 unitage, freight equalized with Rockdale, Tenn., per gross ton	58.50
Ferrophosphorus, electrolytic 23-26% in carlots, f.o.b. Monsato (Siglo), Tenn., 24%, per gross ton, $3 unitage, freight equalized with Nashville	75.00
Ferromolybdenum, per lb. Mo, f.o.b. furnace	95c.
Calcium molybdate, per lb. Mo, f.o.b. furnace	80c.
Molybdenum oxide briquettes 48-52% Mo, per lb. contained Mo, f.o.b. Langeloth, Pa.	80c.

FUEL OIL

No. 3, f.o.b. Bayonne, N. J.	4.70c.
No. 6, f.o.b. Bayonne, N. J.	2.98c.
No. 5 Bur. Stds., del'd Chicago	3.25c.
No. 6 Bur. Stds., del'd Chicago	2.75c.
No. 3 distillate, del'd Cleveland	5.50c.
No. 4 industrial, del'd Cleveland	5.00c.
No. 5 industrial, del'd Cleveland	4.75c.
No. 6 industrial, del'd Cleveland	4.50c.



NEW FARREL ROLLING MILL

for HEAVY DUTY *and* HIGH PRECISION

This 20″ x 32″ two-high cold strip mill is designed for high precision rolling of aluminum, aluminum alloys, duralumin and other non-ferrous metals. It is built with Farrel ruggedness to take heavy passes at high speed and to do it continuously.

The rolls of this mill are forged tool steel, heat-treated and hardened. They are carried in precision type, flood-lubricated sleeve bearings and connected to the pinion stand with universal spindles. The mill housings are of cast steel of very heavy section.

The double motor screwdown, built into the housings, provides ease of manipulation and facilitates setting the rolls with extreme accuracy. Adjustment can be made against the metal while the mill is in operation. A magnetic clutch permits the separate operation of each screw or the synchronization of both, as required. The screwdown gearing is fully enclosed and is lubricated by a continuous circulating system.

The drive is a combined double reduction gear unit and pinion stand with Farrel-Sykes continuous tooth herringbone gears and mill pinions mounted in anti-friction roller bearings. A built-in oil pump provides spray lubrication of the gear teeth and flood lubrication of the bearings.

This mill is typical of the modern design features built into Farrel rolling mills, which permit high speed operation, increase output, improve quality and reduce production costs. Our engineers will be glad to explain the various features available and their applicability to specific conditions.

FARREL

FARREL-BIRMINGHAM COMPANY, Inc.
ANSONIA, CONN.
New York • Buffalo • Pittsburgh • Akron • Chicago • Los Angeles

COKE

Per Net Ton

Furnace, f.o.b. Connellsville, prompt ..... $5.25 to $5.75

Foundry, f.o.b. Connellsville, prompt ..... $5.50 to $6.00

F'dry, by-product, Chicago 10.50

F'dry, by-product, New England 13.00

Foundry, by-product, Newark or Jersey City ..... $11.30 to $11.90

F'dry, by-product, Philadelphia. 11.13

F'dry, by-product, Cleveland.. 11.55

F'dry, by-product, Cincinnati ... 11.00

Foundry, Birmingham 7.50

F'dry, by-product, St. Louis $10.75 to $11.00

Foundry, from Birmingham, f.o.b. cars dock Pacific ports.. ... $14.75

BRITISH

British

Per Gross Ton, f.o.b. United Kingdom Ports

Ferromanganese, export £29 16s. 3d.

Tin plate, per base box. 32s. to 33s.

Steel bars, open hearth..£16 10s.

Beams, open hearth....£15 8s.

Channels, open hearth.. £15 8s.

Angles, open hearth.... £15 8s.

Black sheets, No. 24, gage £22 5s. max.* £22 5s. min.**

Galvanized sheets, No. 24 gage £25 12s. 6d. max.*; £25 12s. 6d. min.**

*Empire markets only.
**Other than Empire markets.

PIG IRON (Per Gross Ton)

Prices delivered various consuming points indicated by bold italics

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phos.
Boston	***$25.50***	***$25.00***	***$26.50***	***$26.00***	.....
Brooklyn	***27.50***	.....	.....	***28.00***	.....
Jersey City	***26.53***	***26.03***	***27.53***	***27.03***	.....
Philadelphia	***25.84***	***25.34***	***26.84***	***26.34***	.....
Bethlehem, Pa.	$25.00	$24.50	$26.00	$25.50	.....
Everett, Mass.	25.00	24.50	26.00	25.50	.....
Swedeland, Pa.	25.00	24.50	26.00	25.50	.....
Steelton, Pa.	.....	24.50	.....	.....	28.50
Birdsboro, Pa.	25.00	24.50	26.00	25.50	28.50
Sparrows Point, Md.	25.00	24.50	.....	.....	.....
Erie, Pa.	24.00	23.50	25.00	24.50	.....
Neville Island, Pa.	24.00	23.50	24.50	24.00	.....
Sharpsville, Pa.††	24.00	23.50	24.50	24.00	.....
Buffalo	24.00	23.00	25.00	24.50	28.50
Cincinnati	***24.44***	***24.61***	.....	***25.11***	.....
Canton, Ohio	***25.39***	***24.89***	***25.89***	***25.39***	.....
Mansfield, Ohio	***25.94***	***25.44***	***26.44***	***25.94***	.....
St. Louis	***24.50***	***24.02***	.....	.....	.....
Chicago	24.00	23.50	24.50	24.00	.....
Granite City, Ill.	24.00	23.50	24.50	24.00	.....
Cleveland	24.00	23.50	24.50	24.00	.....
Hamilton, Ohio	24.00	23.50	.....	24.00	.....
Toledo	24.00	23.50	24.50	24.00	.....
Youngstown††	24.00	23.50	24.50	24.00	.....
Detroit	24.00	23.50	24.50	24.00	.....
St. Paul	***26.63***	.....	***27.13***	***26.63***	.....
Duluth	24.50	.....	25.00	24.50	.....
Birmingham	19.38*	18.00	24.00	.....	.....
Los Angeles, San Francisco and Seattle	***27.50***	.....	.....	.....	.....
Provo, Utah	22.00	.....	.....	.....	.....
Montreal†	27.50	27.50	.....	28.00	.....
Toronto†	25.50	25.50	.....	26.00	.....

GRAY FORGE

Valley or Pittsburgh fce. $24.50

CHARCOAL

Lake Superior fce..... $27.00
Delivered Chicago 30.34

Base prices are subject to an additional charge for delivery within the switching limits of the respective districts.

*Delivered prices on Southern iron for shipment to Northern points are 38c. a ton below delivered prices from nearest Northern basing point on iron with phosphorus content of 0.70 per cent and over. †On all grades 2.25 per cent silicon and under is base. For each 25 points of silicon over 2.25 per cent an extra of 25c. is charged.

WAREHOUSE PRICES

(Base Prices, Dollars per 100 lb., Delivered Metropolitan Areas)

	Pittsburgh	Chicago	Cleveland	Philadelphia	New York	Detroit	Buffalo	Boston	Birmingham	St. Louis	St Paul	Milwaukee	Los Angeles
Sheets, hot rolled	$3.35	$3.05	$3.15	$3.55	$3.58	$3.23	$3.25	$3.51	$3.45	$3.19	$3.30	$3.48	$4.30
Sheets, cold rolled	....	4.10	4.05	4.05	4.40	4.30	4.30	4.58	....	4.12	4.35	4.43	6.50
Sheets, galvanized	4.75	4.60	4.42	4.90	5.00	4.64	4.75	5.11	4.75	4.95	4.75	4.98	5.25
Strip, hot rolled	3.60	3.40	3.30	3.95	3.96	3.48*	3.82	3.86	3.70	3.54	3.65	3.73	....
Strip, cold rolled	3.20	3.30	3.20	3.31	3.51	3.20	3.22	3.26	....	3.41	3.83	3.54	....
Plates	3.40	3.55	3.40	3.55	3.76	3.60	3.62	3.85	3.35	3.47	3.80	3.68	4.00
Structural shapes	3.40	3.55	3.58	3.55	3.75	3.65	3.40	3.85	3.55	3.69	3.80	3.68	4.15
Bars, hot rolled	3.35	3 50	3.25	3.85	3.84	3.43	3 35	3.98	3.50	3.64	3.75	3.63	4.15
Bars, cold finished	3.65	3.75	3.75	4.06	4.09	3.80	3.75	4.13	4.43	4.02	4.34	3.88	6.60
Bars, ht. rld. SAE 2300	7.20	7.10	7.55	7.31	7.35	7.42	7.35	7.50	....	7.47	7.45	7.33	9.40
Bars, ht. rld. SAE 3100	5.75	5.65	5.85	5.86	5.90	5.97	5.65	6.05	....	6.02	6.00	5.88	8.55
Bars, cd. drn. SAE 2300	8.15	8.15	8.15	8.56	8.59	8.45	8.40	8.63	....	8.52	8.84	8.38	10.65
Bars, cd. drn. SAE 3100	6.75	6.75	6 75	7.16	7.19	7.05	6.75	7.23	....	7.12	7.44	6.98	9.80

BASE QUANTITIES: Hot rolled sheets, cold rolled sheets, hot rolled strip, plates, shapes and hot rolled bars, 400 to 1999 lb.; galvanized sheets, 150 to 1499 lb.; cold rolled strip, extras apply on all quantities; cold finished bars, 1500 lb. and over; SAE bars, 1000 lb. and over. Exceptions; Chicago, galvanized sheets, 500 to 1499 lb.; Philadelphia, galvanized sheets, one to nine bundles, cold rolled sheets, 1000 to 1999 lb.; Detroit, galvanized sheets, 500 to 1499 lb.; Buffalo, cold rolled sheets, 500 to 1500 lb., galvanized sheets, 450 to 1499 lb.; Boston, cold rolled and galvanized sheets, 450 to 3749 lb.; Birmingham, hot rolled sheets, strip and bars, plates and shapes, 400 to 3999 lb., galvanized sheets, 500 to 1499 lb.; St. Louis, cold rolled sheets, 400 to 1499 lb., galvanized sheets, 500 to 1499 lb.; Milwaukee, cold rolled sheets, 400 to 1499 lb., galvanized sheets, 150 to 499 lb.; New York, hot rolled sheets, 0 to 1999 lb., cold rolled sheets, 400 to 1499 lb.; St. Paul, galvanized and cold rolled sheets, any quantity, hot rolled bars, plates, shapes, hot rolled sheets, 400 to 14,999 lb.; Los Angeles, hot rolled sheets, bars, plates, shapes, cold rolled sheets, 300 to 1999 lb., galvanized sheets, 150 to 1049 lb. Extras for size, quality, etc., apply on above quotations. *12 gage and heavier, $3.23.

Sales Possibilities

. . . CONSTRUCTION, PLANT EXPANSION AND EQUIPMENT BUYING

North Atlantic States

• **Remington Arms Co.,** Bridgeport, Conn., has let general contract to Harry Maring, Jr., Inc., 536 Lindley Street, for one-story addition, 160 x 200 ft. Cost over $175,000 with equipment.

Fafnir Bearing Co., Booth Street, New Britain, Conn., ball bearings, transmission equipment, etc., has let general contract to Aberthaw Co., 80 Federal Street, Boston, for four-story addition and top story extension to present three-story building. Cost about $100,000 with equipment.

Manning, Maxwell & Moore, Inc., Bridgeport, Conn., valves, steam specialties, etc., has leased close to 50,000 sq. ft. of floor space in former local plant of Saltex Looms, Inc., for expansion.

Taft-Pierce Mfg. Co., Blackstone Street, Woonsocket, R. I., precision machinery and parts, tools, etc., plans one-story addition for production of equipment for War Department. Cost about $400,000 with equipment, to be financed by Government.

Groton Iron Works Shipyards, Groton, New London, Conn., idle for several years, have been acquired by new interests, headed by Alfred Holter and associates, for reported consideration of $550,000, and will modernize for production of steel freighters for British Government.

Greenfield Tap & Die Corp., Greenfield, Mass., taps, gages, dies, etc., has let general contract to E. J. Pinney Co., Inc., 220 Dwight Street, Springfield, Mass., for two-story addition, 82 x 215 ft., to plant No. 1, for production of gages for War Department. Cost over $250,000 with equipment. McClintock & Craig, 458 Bridge Street, Springfield, are consulting engineers.

Corbin Screw Corp., Division of American Hardware Corp., New Britain, Conn., bolts, nuts, screws, etc., has let general contract to Carlson & Torrel, Inc., Dwight Street, for two-story and basement addition, 60 x 95 ft. Cost over $65,000 with equipment.

American Smelting & Refining Co., 120 Broadway, New York, has approved plans for extensions and modernization in smelting plant at Amarillo, Tex. Cost about $200,000 with equipment. Company also is considering plans for electrolytic zinc refinery in Texas for initial capacity of about 2000 tons per month. Plant will include power house, machine and other structures. Cost over $2,500,000 with machinery.

Charles Pfizer & Co., Inc., 81 Maiden Lane, New York, industrial and other chemicals, has let general contract to W. J. Barney Corp., 101 Park Avenue, for four-story addition, 75 x 175 ft., to plant at 11 Bartlett Street, Brooklyn. Cost close to $200,000 with equipment.

Todd Shipyards Corp., 1 Broadway, plans new floating drydock, 116 ft. wide and 614 ft. long, all-welded construction, at Galveston, Tex., for repair and reconditioning of vessels for Navy Department, including shops and equipment. Cost about $2,354,000.

Liberty Aircraft Products Corp., Farmingdale, L. I., aircraft parts and equipment, has let general contract to Brown & Matthews, Inc., 122 East Forty-second Street, New York, for one-story addition, 202 x 300 ft., for production of equipment for Navy Department. Fund of $1,088,000 is being provided by Government for buildings and machinery. A boiler plant will be built.

RCA Mfg. Co., Inc., 411 Fifth Avenue, New York, radio equipment, parts, etc., plans one-story addition to branch plant at 501 North LaSalle Street, Indianapolis. Cost close to $500,000 with equipment.

Chisholm-Ryder Co., Inc., College and Highland Avenues, Niagara Falls, N. Y., equipment for canning and packing plants, has let general contract to Wright & Kremers, Inc., Pine Avenue and Main Street, for one-story addition. Cost close to $50,000 with equipment.

E. I. du Pont de Nemours & Co., Inc., Niagara Falls, N. Y., and Wilmington, Del., has acquired site near local plant of R. & H. Chemicals Division, for new plant for production of chemicals for gas mask service for Government. It will be built on cost-plus-fixed fee basis under contract with Government. Cost over $1,000,000 with equipment.

Doehler Die Casting Co., 386 Fourth Avenue, New York, die-castings, etc., has approved plans for one-story addition to plant at Batavia, N. Y. Cost over $80,000 with equipment.

National Carbon Co., Inc., Niagara Falls, N. Y., has let general contract to deHamel Construction Co., Citizens' Building, Cleveland, for one-story addition for a furnace unit. Cost close to $150,000 with equipment. Main offices are at Cleveland.

Link Aviation Devices, Inc., 121 Montgomery Street, Binghamton, N. Y., aircraft equipment, plans one-story addition for production of equipment for Government. Cost about $324,000 with machinery, in which amount financing is being arranged with Government.

Dodge, Inc., 706 North Hudson Street, Chicago, manufacturer of metal emblems, trophies, etc., has purchased two-story building at 107-9 Tichenor Street, Newark, N. J., for expansion in local four-story adjoining plant, recently acquired for Eastern branch works.

Peter J. Schweitzer, Inc., 994 Newark Avenue, Elizabeth, N. J., cigarette papers and other special paper stocks, has let general contract to D'Elia Building Co., 2761 Hudson Boulevard, Jersey City, N. J., for one-story mill addition, 30 x 100 ft., for storage and distribution. H. K. Smith, 36 Sherman Place, Jersey City, is architect. Cost about $45,000 with equipment.

Otis Elevator Co., 260 Eleventh Avenue, New York, is having plans prepared by Epple & Kahrs, 15 Washington Street, Newark, N. J., architects and engineers, for one-story plant near works at Harrison, N. J., windowless-type, on five-acre tract, for production of crank cases for aircraft engines for War Department. Cost about $6,954,000 with equipment, which will be defrayed by Government.

Curtiss-Wright Corp., Propeller Division, 30 Rockefeller Plaza, New York, plans one-story additions to aircraft propeller-manufacturing plant in Caldwell Township, N. J., for expansion in parts production and assembling departments. Cost reported over $5,000,000 with machinery. Output will be for War Department, which has contracted with company for expansion at new plant at Neville Island, Pittsburgh, and branch plant at Indianapolis, entire development to cost $14,090,000 for buildings and machinery, financing to be provided by Government.

Midvale Co., Nicetown, Philadelphia, has let general contract to United Engineers & Constructors, Inc., 1401 Arch Street, Philadelphia, for one-story building on Wissahickon Avenue, for machining armor plate for Government. Cost about $350,000 exclusive of equipment.

Commanding Officer, Ordnance Department, Picatinny Arsenal, near Dover, N. J., asks bids until Jan. 27 for seamless steel tubing (Circular 1460), aluminum plunger heads, stainless steel supports, brass retainers and brass holders (Circular 1427).

Edward G. Budd Mfg. Co., Twenty-fifth Street and Hunting Park Avenue, Philadelphia, is erecting one-story addition for which general contract recently was let to Wark & Co., 1700 Sansom Street. Cost over $600,000 with equipment. Ballinger Co., 105 South Twelfth Street, is architect and engineer.

Bureau of Yards and Docks, Navy Department, Washington, asks bids (no closing date stated) for three electric traveling bridge cranes and four electric wall cranes for Philadelphia Navy Yard (Specifications 10261).

Prest-O-Lite Co., Inc., 311 Ross Street, Pittsburgh, gas cylinders, has let general contract to B. A. Groah Construction Co., 847 West North Avenue, for one-story addition to acetylene plant at McKees Rocks, Pa., for hydrogen division. Cost over $50,000 with equipment.

Duquesne Light Co., 435 Sixth Avenue, Pittsburgh, has approved plans for new steam-electric generating plant at Wireton, near Ambridge, Pa., where 50 acres has been acquired, installation to include 60,000-kw. steam turbine-generators and accessories, high-pressure boilers and auxiliary equipment. Cost about $8,000,000 including line extensions.

General Purchasing Officer, Panama Canal, Washington, asks bids until Jan. 27 for 16,000 lb. of galvanized steel wire nails, 30,000 lb. of roofing nails, 2000 lb. of steel wire nails, 48,000 lb. of finishing nails, 10,000 lb. of flooring nails, 2700 lb. of copper wire nails, 6000 lb. of galvanized boat spikes, 900 lb. of boat nails, and 600 lb. of cut copper nails (Schedule 4717).

Standard Plating Works, Inc., 402 Fallsway Street, Baltimore, metal plating, metal goods, etc., has let general contract to Baltimore Contractors, Inc., 19 North Central Avenue, for new one and two-story plant at 411 North Exeter Street. Cost about $45,000 with equipment. Samuel Smulian, 3721 Belle Avenue, is architect.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Jan. 28 for low-pressure air compressors, with spare parts, tools and wrenches (Schedule 4925) for Boston and Puget Sound, Wash., Navy yards; until Feb. 4, 16 floating workshops for Norfolk Navy Yard, and like number of similar workshops for Mare Island yard (Schedule 4938).

The South

• **Diraplane Mfg. Corp.,** 927 Fifteenth Street, N. W., Washington, airplanes and parts, has acquired tract at Pensacola, Fla., for new plant, totaling about 230,000 sq. ft. of floor space, for parts production and assembling. Power house will be built. Company also plans airport and hangar in immediate vicinity. Main plant will be air-conditioned. Cost close to $700,000 with equipment. Eric Langlands, Room 1210, first noted address, is secretary and company engineer.

Director of Purchases, Tennessee Valley Authority, Knoxville, Tenn., asks bids until Jan. 27 for one flat bottomed water surge tank for Duck River pumping station; until Jan. 28, about 41 tons of galvanized steel transmission towers for Nashville, Tenn.

Johnson & Johnson, Inc., George Street, New Brunswick, N. J., drugs, chemicals, surgical dressings, etc., has contracted with War Department for construction and operation of smokeless powder mill and bag-loading plant at Childersburg, near Sylacauga, Ala., where 28,000 acres has been selected. It will include power house, pumping station, machine shop and other mechanical structures. Entire project will cost about $72,000,000, of which approximately $52,000,000 will be used for powder mill. Appropriation in such amount will be provided by Government.

Commanding Officer, Submarine Mine Depot, Coast Artillery Corps, Fort Monroe, Va., asks bids until Jan. 28 for 335 cast iron anchors (Circular 42).

North Carolina Shipbuilding Corp., Wilmington, N. C., is being organized as interest of Newport News Shipbuilding & Dry Dock Co., Newport News, Va., to operate new plant to be built at Wilmington by parent company. Yard will comprise about six shipways, with

Products Index

WHO MAKES IT

Here you find a weekly listing of hundreds of products with the names and addresses of manufacturers. The advertisements of these companies appear in The Iron Age.

ABRASIVE CLOTH & PAPER
Carborundum Co., The Niagara Falls, N. Y.
Norton Co., Worcester, Mass.

ABRASIVE GRAIN
Abrasive Co., Philadelphia, Pa.
Carborundum Co., The Niagara Falls, N. Y.

ABRASIVE WHEELS — See Grinding Wheels

ABRASIVES—Steel Shot and Grit
American Foundry Equipment Co., The, 510 S. Byrkit St., Mishawaka, Ind.
Harrison Abrasive Corp., Manchester, N. H.
Pangborn Corporation, Hagerstown, Md.
Pittsburgh (Pa.) Crushed Steel Co.
Steel Shot & Grit Co., Boston, Mass.

ACCESSORIES—Welding
Lincoln Electric Co., The, Cleveland.

ACCUMULATORS—Hydraulic
Baldwin-Southwark Div. Baldwin Locomotive Wks., Philadelphia.
Watson-Stillman Co., The, 103 Aldene Road, Roselle, N. J.
Wood, R. D., & Co., Philadelphia, Pa.

ACETYLENE—Dissolved in Cylinders & Small Tanks
Air Reduction, 60 East 42nd St., N.Y.C.
Linde Air Products Company, The, 30 East 42nd St., N. Y. C.

ACIDS—Pickling
American Chemical Paint Co., Ambler, Pa.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

AIR CONDITIONING EQUIPMENT
American Blower Corp., 6000 Russell St., Detroit, Mich.

ALLOYS—Bismuth
Cerro De Pasco Copper Corp., 44 Wall St., New York City.

ALLOYS—Copper
American Brass Co., The, Waterbury, Conn.
Mallory, P. R., & Co., Inc., Indianapolis, Ind.

ALLOYS—Corrosion & Abrasion Resistant
Wall-Colmonoy Corp., Detroit, Mich.

ALLOYS—Ferro
Electro Metallurgical Sales Corp., 30 East 42nd St., N. Y. C.

ALLOYS—Low Melting Matrix
Cerro De Pasco Copper Corp., 44 Wall St., New York City.

ALLOYS—Magnesium
American Magnesium Corp., 1701 Gulf Bldg., Pittsburgh.
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

ALLOYS—Phosphor Bronze
Phosphor Bronze Smelting Co., The, Philadelphia, Pa.

ALLOYS—Titanium
Titanium Alloy Mfg. Co., The, Niagara Falls, New York.

ALLOYS—Tungsten
Vanadium Corp. of America, 420 Lexington Ave., New York City.

ALLOYS—Vanadium
Vanadium Corp. of America, 420 Lexington Ave., New York City.

ALLOYS—Zinc For Die Castings
New Jersey Zinc Co., The, 160 Front St., N. Y. C.

ALUMINUM
Aluminum Co. of America, Pittsburgh.

AMMETERS & VOLTMETERS
General Electric Co., Schenectady, N. Y.

AMMETERS AND VOLTMETERS—Recording
Leeds & Northrup Co., 4956 Stenton Ave., Philadelphia.

AMMONIA RECOVERY PLANTS
Koppers Co., Engineering & Construction Div., Pittsburgh.

ANGLES, BEAMS, CHANNELS AND TEES
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Holliday, W. J., & Co., Hammond, Ind.
Inland Steel Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.
Ryerson, Jos. T., & Son, Inc., Chicago.
Scully Steel Products Co. (U. S. Steel Corp. Subsidiary), Chicago
Steel & Tubes Div. of Republic Steel Corp., Cleveland.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.

ANGLES, BEAMS, CHANNELS & TEES —Magnesium Alloys
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

ANNEALING—See Heat Treating

ANNEALING BOXES
Lebanon (Pa.) Steel Foundry.
United Engineering & Fdry. Co., Pgh.

ANODES—Lead
National Lead Co., 111 Bdway., N. Y. C.

APPAREL—Welding
Lincoln Electric Co., The, Cleveland.

ARBORS
Cincinnati (Ohio) Milling Mch. Co., The.
Morse Twist Drill & Mch. Co., New Bedford, Mass.

ARRESTERS—Spark
Harrington & King Perforating Co., The, Chicago.

ASBESTOS
Carey, Philip, Co., The, Cincinnati, Ohio.
Johns-Manville Corp., 22 East 40th St., N. Y. C.

AXLES—Car or Locomotive
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

BABBITT METALS
Bunting Brass & Bronze Co., The, Toledo, Ohio.
Cadman, A. W., Mfg. Co., Pittsburgh.
Cramp Brass & Iron Foundries Co., Philadelphia.
National Lead Co., 111 Bdway., N. Y. C.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.

BALANCING EQUIPMENT
Sundstrand Machine Tool Co., Rockford, Ill.

BALANCING MACHINES — Statie Dynamic
Gisholt Machine Co., Madison, Wis.

BALING PRESSES—Scrap — See Presses —Baling

BALLS—Burnishing
Abbott Ball Co., The, 1047 New Britain Ave., Hartford, Conn.
Hartford (Conn.) Steel Ball Co., The.

BALLS, Steel
Abbott Ball Co., The, 1047 New Britain Ave., Hartford, Conn.
Fafnir Bearing Co., The, New Britain, Conn.
Hartford (Conn.) Steel Ball Co., The.
McIntyre Machine Works, Hartford, Conn.
New Departure Div., General Motors Sales Corp., Bristol, Conn.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.

BANDS—Steel
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.

BARRELS—Burnishing
Abbott Ball Co., The, 1047 New Britain Ave., Hartford, Conn.

BARRELS—Sand Blast
American Foundry Equip. Co., The, 510 S. Byrkit St., Mishawaka, Ind.
Hydro-Blast Corp., The, Chicago, Ill.

BARRELS—Tumbling
Baird Mch. Co., The, Bridgeport, Conn.
Hartford (Conn.) Steel Ball Co., The.
Whiting Corp., Harvey, Ill.

BARS—Alloy
Copperweld Steel Co., Warren, Ohio.
Midvale Co., The, Nicetown, Phila., Pa.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.

BARS—Aluminum
Aluminum Co. of America, Pittsburgh.

BARS—Brass, Bronze or Copper
Bunting Brass & Bronze Co., Toledo, Ohio.
Johnson Bronze Co., 505 So. Mill St., New Castle, Pa.

BARS—Cold Drawn
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Cleveland.
Bliss & Laughlin, Inc., Harvey, Ill.; Buffalo, N. Y.
Holliday, W. J., & Co., Hammond, Ind.
Jones & Laughlin Steel Corp., Pittsburgh.
Monarch Steel Co., Indianapolis, Ind.
Union Drawn Steel Div. Republic Steel Corp., Massillon, Ohio.

BARS—Concrete, Reinforcing
Bethlehem (Pa.) Steel Company.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Jones & Laughlin Steel Corp., Pittsburgh.
Laclede Steel Co., St. Louis, Mo.
Nicetown Plate Washer Co., Inc., Philadelphia.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.

BARS—Magnesium Alloys
American Magnesium Corp., 1701 Gulf Bldg., Pittsburgh.
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

BARS—Rustless
Midvale Co., The, Nicetown, Phila., Pa.
Rustless Iron & Steel Corp., Baltimore, Md.

BARS—Steel
Beals, McCarthy & Rogers, Inc., Buffalo, New York.
Bethlehem (Pa.) Steel Company.
Brown-Wales Co., Boston, Mass.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Copperweld Steel Co., Warren, Ohio.
Frasse, Peter A., & Co., Inc., 17 Grand St., New York City.
Great Lakes Steel Corp., Ecorse, Detroit
Holliday, W. J., & Co., Hammond, Ind.
Inland Steel Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh
LaSalle Steel Co., Chicago.
Monarch Steel Co., Indianapolis, Ind.
Potts, Horace T., Co., Philadelphia, Pa.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Scully Steel Products Co. (U. S. Steel Corp. Subsidiary), Chicago.
Steel & Tubes Div. of Republic Steel Corp., Cleveland.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.
Wisconsin Steel Co., Chicago, Ill.
Youngstown (Ohio) Sheet & Tube Co., The

BATTERIES—Storage
Electric Storage Battery Co., The, Phila.
Philco, Battery Div., Phila., Pa.

BATTERY CHARGERS
Cutler-Hammer, Inc., Milwaukee.

BEAMS—See Angles, Beams, Channels and Tees

BEARINGS—Babbitt
Bunting Brass & Bronze Co., The, Toledo, Ohio.
Cadman, A. W., Mfg. Co., Pittsburgh.
Johnson Bronze Co., 505 So. Mill St., New Castle, Pa.

BEARINGS—Ball
Bantam Bearings Corp., The, South Bend, Ind.
Bearings Co. of America, Lancaster, Pa.
Fafnir Bearing Co., The, New Britain, Conn.
Federal Bearings Co., Inc., The, Poughkeepsie, N. Y.
McIntyre Machine Works, Hartford, Conn.
New Departure Div., General Motors Sales Corp., Bristol, Conn.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Schatz Mfg. Co., Poughkeepsie, N. Y.
Torrington (Conn.) Company.

BEARINGS, Brass and Bronze
Ampco Metal, Inc., Milwaukee, Wis.
Bunting Brass & Bronze Co., Toledo, O.
Johnson Bronze Co., 505 So. Mill St., New Castle, Pa.
National Bearing Metals Corp., Pittsburgh.
Shenango-Penn Mold Co., Dover, Ohio.

BEARINGS—Needle
Torrington (Conn.) Company.

BEARINGS—Oilless
Bunting Brass & Bronze Co., Toledo, O.
Rhoades, R. W., Metaline Co., Inc., Long Island City, N. Y.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.

BEARINGS—Quill
Bantam Bearings Corp., The, South Bend, Ind.

BEARINGS—Radial
Bantam Bearings Corp., The, South Bend, Ind.
Bower Roller Bearing Co., Detroit, Mich.
Fafnir Bearing Co., The, New Britain, Conn.
Federal Bearings Co., Inc., The, Poughkeepsie, N. Y.
Hyatt Bearings Div. General Motors Sales Corp., Harrison, N. J.
New Departure Div., General Motors Sales Corp., Bristol, Conn.
Norma-Hoffmann Bearings Corp., Stamford Conn.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.

BEARINGS—Roll Neck
Bantam Bearings Corp., The, South Bend, Ind.
Morgan Construction Co., Worcester, Mass.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS—Roller
Bantam Bearings Corp., The, South Bend, Ind.
Bower Roller Bearing Co., Detroit, Mich.
Hyatt Bearings Div. General Motors Sales Corp., Harrison, N. J.
Link-Belt Co., 519 North Holmes Ave. Indianapolis, Ind.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS—Roller Tapered
Bantam Bearings Corp., The, South Bend, Ind.
Bower Roller Bearing Co., Detroit, Mich.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS—Rolling Mill Equipment
Bantam Bearings Corp., The, South Bend, Ind.
Morgan Construction Co., Worcester, Mass.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS—Shaft Hanger
Fafnir Bearing Co., The, New Britain, Conn.
Hyatt Bearings Div. General Motors Sales Corp., Harrison, N. J.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.

BEARINGS—Thrust
Bantam Bearings Corp., The, South Bend, Ind.
Bearings Co. of America, Lancaster, Pa.
Fafnir Bearing Co., The, New Britain, Conn.
Federal Bearings Co., Inc., The, Poughkeepsie, N. Y.
Hyatt Bearings Div. General Motors Sales Corp., Harrison, N. J.
New Departure Div., General Motors Sales Corp., Bristol, Conn.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
Timken Roller Bearing Co., The, Canton, O.

BELT—Conveyor, Elevator
Hewitt Rubber Corp., Buffalo, N. Y.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Towsend St., Passaic, N. J.

BELTING—Leather
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.

BELTING—Metal, Conveyor, High and Low Temperature
Wickwire Spencer Steel Co., 500 Fifth Ave., N. Y. C.

BELTING—Rubber
Hewitt Rubber Corp., Buffalo, N. Y.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Towsend St., Passaic, N. J.

BELTS—V-Type
Allis-Chalmers Mfg. Co., Milwaukee.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Towsend St., Passaic, N. J.

BENCH LEGS—Steel
New Britain-Gridley Machine Div., The New Britain Machine Co., New Britain, Conn.

BENCH PLATES
Challenge Machinery Co., Grand Haven, Mich.

BENDING—Pipe and Tube
Swan Engineering Co., Inc., Newark, N. J.

BENDING MACHINES—Hand, Band and Angle
Excelsior Tool & Mch. Co., E. St. Louis, Ill.

two fitting-out piers, machine and other mechanical shops, woodworking, pipe and other shop units, power house and auxiliary buildings. Cost over $2,500,000 with equipment. Company has secured contract for 24 vessels for U. S. Maritime Commission. Capt. Roger Williams, vice-president of parent company, will be an official of new organization.

Tennessee Copper Co., Copperhill, Tenn., plans new plant at Isabella, near Copperhill for production of sulphuric acid, to include power plant, machine shop, storage and distributing buildings, and auxiliary structures. Cost over $1,000,000 with equipment. Executive offices are at 61 Broadway, New York.

Continental Oil Co., Ponca City, Okla., has let general contract to Whitehurst Construction Co., Beeville, Tex., for new bulk storage and distributing plant at last noted place, to include steel tank storage units, pumping station and other facilities. Cost over $85,000 with equipment.

Douglas Aircraft Corp., Santa Monica, Cal., plans new works at Tulsa, Okla., for assembling heavy bomber-type airplanes for War Department, with storage and distributing buildings, power house and auxiliary structures. Cost close to $10,000,000, in which amount funds will be provided by Government.

City Council, Goldthwaite, Tex., plans early call for bids for new municipal power plant. Proposed to use diesel engine-generator units and accessories. Bond issue of $100,000 has been authorized for project. Garrett Engineering Co., 918 Richmond Road, Houston, Tex., is consulting engineer.

Central States

• **Hertner Electric Co.**, 12690 Elmwood Avenue, Cleveland, electric motors and generators, parts, etc., will take bids soon on general contract for one-story addition, 60 x 240 ft. Cost close to $100,000 with equipment.

Cleveland Wire Cloth & Mfg. Co., 3573 East Seventy-eighth Street, Cleveland, has let general contract to Dunbar Co., 3201 Cedar Avenue, for two-story addition, 65 x 95 ft. Cost over $60,000 with equipment.

Goodyear Engineering Corp., Akron, Ohio, recently organized subsidiary of Goodyear Tire & Rubber Co., has contracted with War Department for construction and operation of new powder-bagging plant on 3000-acre tract near Charlestown, Ind., to be known as Hoosier Ordnance Works. It will consist of storage and distribution buildings, power house, machine and mechanical shops, and auxiliary structures. Cost close to $13,900,000 for buildings and equipment, fund to be provided by Government. New plant will be operated in conjunction with Indiana Ordnance Works at same place, now in course of erection by E. I. du Pont de Nemours & Co., Inc.

Rahn-Larmon Co., 2941 Spring Grove Avenue, Cincinnati, lathes, parts and other tools, will take bids soon on general contract for new one-story plant at Central Parkway and Sassafras Street, 150 x 350 ft. Cost close to $350,000 with equipment. Charles T. Kennedy, 870 Ridgeway Avenue, is architect.

American Coach & Body Co., 9503 Woodland Avenue, Cleveland, metal automobile bodies, winches for trucks, etc., has let general contract to H. L. Vokes Co., 5300 Chester Avenue, for one-story addition, 45 x 130 ft. Cost over $75,000 with equipment. A. R. Simon, last noted address, is consulting engineer.

Studebaker Corp., South Bend, Ind., plans two new plants for production of Wright airplane engines for War Department, one at end of Chippewa Avenue, where 21 acres has been secured, and other near Fort Wayne, Ind., on 24-acre tract on Lincoln Highway, near State Highway 24. Each will include storage and distributing buildings, power houses and auxiliary structures. Last noted plant will be used for parts production, with South Bend works for assembling. Another parts manufacturing plant will be built at Chicago. Fund of about $36,800,000 will be provided by Government for projects.

Knapp-Monarch Co., 3501 Bent Street, St. Louis, household electric appliances, plans one-story addition to branch plant at Dover, Ohio, to be used by its subsidiary, Sparklet Devices, Inc., electric devices. Cost close to $125,000 with equipment.

Continental Can Co., 100 East Forty-second Street, New York, has let general contract to Austin Co., Cleveland, for one-story plant, 440 x 460 ft., with one and two-story adjoining building, 340 x 400 ft., for storage and distribution, and office service, on 15-acre tract at North Broadway and Humbodlt Street, St. Louis. It will replace present works at 5221 Natural Bridge Avenue, providing increased capacity. Cost over $1,000,009 with equipment. W. W. Taylor is manager of company construction division, 4633 West Grand Avenue, Chicago.

Santa Fe Railway Co., Topeka, Kan., plans one-story addition to main car shop at West Wichita, Kan., maintenance and repair works. Cost over $40,000 with equipment.

Continental Aviation & Engineering Corp., 1260 Algonquin Avenue, Detroit, airplanes and parts, has let general contract to F. H. Martin Construction Co., 955 East Jefferson Street, for two-story addition, 70 x 165 ft., for testing division and other mechanical service. Cost over $100,000 with equipment.

Kellogg Co., Battle Creek, Mich., cereals, has approved plans for expansion and improvements in power plant, including new steam-generating equipment for processing and power station service, turbine-generator and auxiliary equipment; also new water treatment plant and other facilities. Cost close to $790,000 with equipment. Sargent & Lundy, 140 South Dearborn Street, Chicago, are consulting engineers. Company also will make extensions and improvements in manufacturing plant, with installation of new grit bins, cook room apparatus, packing room equipment, processing machinery, etc. Cost about $200,000 with equipment.

Hudson Motor Car Co., 12601 East Jefferson Street, Detroit, has contracted with War Department for construction and operation of new ordnance plant for production of guns, torpedoes and allied equipment. Tract of 114 acres has been selected at Mound and Nine-Mile Roads, Wayne Township, near Detroit, for plant totaling about 400,000 ft. of floor space, with adjoining structures for storage and distribution. A power house will be built. Cost about $13,000,000, fund in that amount to be provided by Government.

Da-Lite Screen Co., 2723 North Pulaski Road, Chicago, motion picture screens and apparatus, has let general contract to L. J. Graf Construction Co., 700 North Michigan Avenue, for two-story and basement plant at 2711 North Pulaski Road, 55 x 125 ft. Cost over $75,000 with equipment. Frederick Stanton, 307 North Michigan Avenue, is architect.

Frontier Refining Co., Second and Duff Streets, Cheyenne, Wyo., plans expansion and improvements in oil refinery, including new cracking unit for gasoline production, steel tank storage units and other facilities. Cost close to $250,000 with equipment.

Quaker Petroleum Co., Bettendorf, Iowa, has approved plans for new bulk storage and distributing plant on river front, comprising barge dock, one-story building, steel tank units and other facilities. Cost over $50,000 with equipment.

Pepper Packing & Provision Co., Washington Street and East Forty-sixth Avenue, Denver, meat packer, plans one and two-story addition, 172 x 180 ft. Cost over $125,000 with equipment. Packers Architectural & Engineering Co., 1824 North Ninth Street, St. Louis, is architect and engineer.

General Electric X-Ray Corp., 2012 West Jackson Boulevard, Chicago, X-ray apparatus and parts, will take bids soon on general contract for five-story and basement addition, 115 x 120 ft. Cost over $250,000 with equipment. Graham, Anderson, Probst & White, 80 East Jackson Boulevard, are architects.

Monsanto Chemical Co., St. Louis, plans erection of new chemical plant adjacent to its works at Monsanto, Ill. Cost of plant will be defrayed by Government which will retain title to buildings and installations. Monsanto company has requested that plant be operated and its products furnished at cost, no profit whatsoever accruing to company.

Western States

• **Boeing Aircraft Co.**, 7901 East Marginal Way, Seattle, airplanes and parts, has let general contract to Austin Co., Dexter-Horton Building, for two one and two-story additions, for expansion in parts production and assembling, storage and distributing facilities. Cost about $4,865,000 with equipment.

Bureau of Yards and Docks, Navy Department, Washington, asks bids (no closing date stated) for two 20-ton gasoline-electric traveling jib cranes for Puget Sound Navy Yard, Wash. (Schedule 10206).

Pacific Screw Products Co., 5209 Southern Avenue, South Gate, near Los Angeles, screw machine products, has let general contract to William J. Moran, 1011 South Fremont Street, Alhambra, Cal., for one-story machine shop. Cost over $60,000 with equipment.

Bethlehem Steel Co., Shipbuilding Division, Terminal Island, Los Angeles, has let general contract to Ford J. Twaits Co., 816 West Fifth Street, for three-story storage and distributing building, 130 x 230 ft. Cost close to $150,000 with equipment. J. H. Davies, Ocean Center Building, Long Beach, Cal., is consulting engineer.

Mixermobile Mfg. Co., Portland, mixing machinery and parts, care of Arthur P. Cramer, Bedell Building, consulting engineer, has let general contract to Ward & Milbrandt, 4232 N. E. Sandy Boulevard, for new one-story plant, 90 x 125 ft., at 6090 N. E. Halsey Street, for parts production and assembling. Installation will include a 20-ton overhead electric traveling crane, hoists, and other mechanical-handling facilities. Cost close to $75,000 with equipment.

Todd-Seattle Dry Docks, Inc., Harbor Island, Seattle, has let general contract to General Construction Co., Seattle, for new fitting-out pier at shipyard, 600 ft. long and 46 ft. wide. A traveling crane and other mechanical-handling equipment will be installed. Cost over $175,000.

John A. Roebling's Sons Co., Inc., 646 Folsom Street, San Francisco, wire rope, cables, wire cloth, etc., will take bids soon on general contract for one-story addition, for expansion in production division, with part reserved for storage and distribution. Cost close to $265,000 with equipment. Main offices are at Trenton, N. J.

Canada

• **Sangamo Co., Ltd.**, 185 George Street, Leaside, Toronto, electric meters and kindred electrical apparatus, has let general contract to Anglin-Norcross Ontario, Ltd., 57 Bloor Street West, Toronto, for one-story addition, 120 x 150 ft. Cost about $175,000 with equipment. Harkness & Hertzberg, 57 Bloor Street West, are architects and engineers. Company is a subsidiary of Sangamo Electric Co., Springfield, Ill.

Aluminum Co. of Canada, Ltd., Sun Life Building, Montreal, has low bid at about $150,000 from Foundation Co., Quebec, Ltd., 1538 Sherbrooke Street West, Montreal, for four one-story units for plant at Coteau Landing, Que., about 100 x 700 ft. Cost over $400,000 with equipment.

MacDonald Brothers Aircraft, Ltd., Winnipeg, Man., airplanes and parts, has let general contract to Carter-Halls-Aldinger Co., Ltd., Royal Bank Building, for new one-story plant for parts production and assembling of airplanes for Canadian Government, which is interested in project. Cost about $275,000 with equipment.

Weatherhead Co. of Canada, Ltd., 180 Talbot Street, St. Thomas, Ont., will build one-story plant addition, 83 x 289 ft., to cost, with equipment, about $50,000. Bids are being received by J. T. Findlay, architect, 17 Hincks Street.

Canadian National Railways, 360 McGill Street, Montreal, has let general contract to E. G. M. Cape & Co., 620 Cathcart Street, for repair shop at Point St. Charles works, to cost $70,000.

Calgary Power Co., Calgary, Alta., has received permission and will start work at once with construction of power dam and power plant project at Lake Minnewanka to develop 23,000 hp.

Products Index

BENDING MACHINES—Hand and Power
Buffalo (N. Y.) Forge Co., 492 Broadway.
Cincinnati (Ohio) Shaper Co., The.
Cleveland Crane & Engineering Co. The, Steelweld Mchry. Div., Wickliffe, Ohio.
Cleveland (Ohio) Punch & Shear Works Co., The.
Dreis & Krump Mfg. Co., Chicago, Ill.
Niagara Machine & Tool Works, Buffalo, N. Y.
Yoder Co., The, Cleveland, Ohio.

BENZOL RECOVERY PLANTS
Koppers Co., Engineering & Construction Div., Pittsburgh.

BERYLLIUM COPPER
American Brass Co., The, Waterbury, Conn.

BILLETS—Alloy
Harrisburg (Pa.) Steel Corp.
Midvale Co., The, Nicetown, Phila., Pa.

BILLETS—Alloy Steel
Andrews Steel Co., The, Newport, Ky.
Copperweld Steel Co., Warren, Ohio.

BILLETS—Carbon
Harrisburg (Pa.) Steel Corp.

BILLETS—Carbon Steel
Andrews Steel Co., The, Newport, Ky.

BILLETS—Chrome Nickel Steel
Rustless Iron & Steel Corp., Baltimore, Md.

BILLETS—Chrome Steel
Rustless Iron & Steel Corp., Baltimore, Md.

BILLETS—Forging
Alan Wood Steel Co., Conshohocken, Pa.
Andrews Steel Co., The, Newport, Ky.
Harrisburg (Pa.) Steel Corp.
Republic Steel Corp., Cleveland, Ohio.

BILLETS—Re-rolling
Alan Wood Steel Co., Conshohocken, Pa.
Andrews Steel Co., The, Newport, Ky.

BILLETS—Re-rolling Facilities
Nicetown Plate Washer Co., Inc., Philadelphia, Pa.

BILLETS—Steel
Bethlehem (Pa.) Steel Company,
Continental Steel Corp., Kokomo, Ind.
Copperweld Steel Co., Warren, Ohio.
Holliday, W. J., & Co., Hammond, Ind.
Jones & Laughlin Steel Corp., Pittsburgh.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
Wisconsin Steel Co., Chicago, Ill.

BLANKS—Chisel
Cleveland (Ohio) Punch & Shear Works Co., The.
Cleveland Steel Tool Co., The, 660 E. 82nd St., Cleveland, Ohio.

BLANKS—Gear and Pinion
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.

BLAST CLEANING EQUIPMENT
American Foundry Equipment Co., The, 510 S. Byrkit St., Mishawaka, Ind.
Hydro-Blast Corp., The, Chicago, Ill.
Pangborn Corporation, Hagerstown, Md.

BLAST FURNACE PLANTS—Complete
Brassert, H. A., & Co., Pittsburgh, Pa.
McKee, Arthur G., & Co., Cleveland.

BLAST FURNACE SPECIALTIES
Bailey, Wm. M., Co., Pittsburgh, Pa.
McKee, Arthur G., & Co., Cleveland.

BLAST GATES
Rockwell, W. S., Co., 50 Church St.,N.Y.C.

BLOCKS—Chain
Ford Chain Block Div. American Chain & Cable Co., Inc., Philadelphia, Pa.
Yale & Towne Mfg. Co., The, Phila. Div., Phila., Pa.

BLOWERS
American Blower Corp., 6000 Russell St., Detroit, Mich.
Ingersoll-Rand Co., 11 Broadway, New York City.

BLOWERS—Blast Furnace
Allis-Chalmers Mfg. Co., Milwaukee, Wis.

BLOWERS—Centrifugal
Allis-Chalmers Mfg. Co., Milwaukee, Wis.

BLOWERS—Cupola
Allis-Chalmers Mfg. Co., Milwaukee, Wis.

BLOWERS—Fan Housings
Detroit (Mich.) Stamping Co.

BLOWERS—Rotary & Centrifugal
Roots-Connersville Blower Corp., Connersville, Ind.

BLOWPIPES—Oxy-Acetylene Welding & Cutting
Linde Air Products Company, The, 30 East 42nd St., N. Y. C.
Weldit Acetylene Co., Detroit, Mich.

BLOWPIPES — Soldering, Heating, Annealing
American Gas Furnace Co., Elizabeth, N. J.
Weldit Acetylene Co., Detroit, Mich.

BLUE PRINT PAPER
Pease, C. F., Company, The, 2695 W. Irving Pk. Road, Chicago, Ill.

BLUE PRINTING MACHINERY
Pease, C. F., Company, The, 2695 W. Irving Pk. Road, Chicago, Ill.

BOILERS—Waste Heat
Babcock & Wilcox Co., The, 85 Liberty St., N. Y. C.

BOILERS—Water Tube
Babcock & Wilcox Co., The, 85 Liberty St., N. Y. C.

BOLT CUTTERS
Landis Mch. Co., Inc., Waynesboro, Pa.

BOLT AND NUT MACHINERY
Ajax Mfg. Co., The, Cleveland, Ohio.
Hill Acme Co., The, Cleveland, Ohio.
Landis Machine Co., Inc., Waynesboro, Pa.
Waterbury (Ct.) Farrel Fdry. & Mch Co., The.

BOLT & RIVET CLIPPERS
Helwig Mfg. Co., St. Paul, Minn.

BOLTS—Carriage and Machine
Bethlehem (Pa.) Steel Company.
Cleveland (Ohio) Cap Screw Co., The.
Erie (Pa.) Bolt & Nut Co.
Lamson & Sessions Co., The, Cleveland.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Triplex Screw Co., Cleveland.

BOLTS—Special
Cleveland (Ohio) Cap Screw Co., The.
Erie (Pa.) Bolt & Nut Co.
Lamson & Sessions Co., The, Cleveland.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

BOLTS—Special, Hot or Cold Upset
Lamson & Sessions Co., The, Cleveland.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

BOLTS—Stove
Lamson & Sessions Co., The, Cleveland.
Progressive Mfg. Co., Torrington, Conn.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

BOLTS—Stove, Recessed Head
American Screw Co., Providence, R. I.

BOLTS—Track
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

BOLTS AND NUTS
American Screw Co., Providence, R. I.
Bethlehem (Pa.) Steel Company.
Clark Bros. Bolt Co., Milldale, Conn.
Cleveland (Ohio) Cap Screw Co., The.
Erie (Pa.) Bolt & Nut Co
Lamson & Sessions Co., The, Cleveland.
Republic Steel Corp., Cleveland, Ohio.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Triplex Screw Co., Cleveland.

BOLTS AND NUTS—Self Locking
Lamson & Sessions Co., The, Cleveland.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

BORING BARS
Bullard Co., The, Bridgeport, Conn.
Carboloy Co., Inc., 11153 East 8-Mile Road, Detroit, Michigan.
Gairing Tool Co., The, Detroit.
Gisholt Machine Co., Madison, Wisconsin.

BORING, DRILLING & MILLING MACHINES—Horizontal
Giddings & Lewis Machine Tool Co., Fond Du Lac, Wis.
Hill-Clarke Mchry. Co., 647 W. Washington Blvd., Chicago.
Lucas Machine Tool Co., Cleveland.
Sellers, William, & Co., Inc., 1620 Hamilton St., Philadelphia, Pa.

BORING & DRILLING MACHINES—Vertical
Bullard Co., The, Bridgeport, Conn.

BORING MACHINES—Diamond & Carbide Tools
Heald Machine Co., Worcester, Mass.

BORING MACHINES—Jig
Pratt & Whitney Div. Niles-Bement-Pond Co., West Hartford, Conn.

BORING MACHINES—Precision
Cimatool Co., The, Dayton, Ohio.
Ex-Cell-O Corp., 1210 Oakman Blvd., Detroit, Mich.

BORING & TURNING MILLS—Vertical
Bullard Co., The, Bridgeport, Conn.
Cincinnati (Ohio) Planer Co.
Sellers, William, & Co., Inc., 1620 Hamilton St., Philadelphia, Pa.

BRACES—Bit
North Bros. Mfg. Co., Philadelphia, Pa.

BRAKE LINING & BLOCKS—Asbestos
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Towsend St., Passaic, N. J.

BRAKES—Electric
Clark Controller Co., The, Cleveland.
Cutler-Hammer, Inc., Milwaukee.
Electric Controller & Mfg. Co., The, Cleveland.

BRAKES—Electric & Mechanical
Clark Controller Co., The, Cleveland.
Electric Controller & Mfg. Co., The, Cleveland.

BRAKES—Magnetic
Stearns Magnetic Mfg. Co., 635 So. 28th St., Milwaukee.

BRAKES—Metal Forming
Bryant Machinery & Engineering Co. Chicago.
Cincinnati (Ohio) Shaper Co., The.
Cleveland Crane & Engineering Co., The Steelweld Machinery Div., Wickliffe, Ohio.
Dreis & Krump Mfg. Co., Chicago.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.

BREAKERS—Electric Circuit
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Sauereisen Cements Co., Pittsburgh, Pa.

BRICK—Fire Clay
Illinois Clay Products Co., Joliet, Ill.

BRICK—Insulating
Babcock & Wilcox Co., The, 85 Liberty St., N. Y. C.
Carborundum Co., The Perth Amboy, N. J.

BRICK—Polishers
Siefen, J. J., Co., Detroit, Mich.

BRICK-REFRACTORY
Carborundum Co., The Perth Amboy, N. J.

BRIDGE BUILDERS
American Bridge Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Belmont Iron Works, Philadelphia.

BRIDGE OPERATING MACHINERY—Movable
Earle Gear & Mch. Co., Philadelphia.

BRIQUETS—Ferroalloy
Electro Metallurgical Sales Corp., 30 East 42nd St., N. Y. C.

BROACHES
Colonial Broach Co., Detroit.
Ex-Cell-O Corp., 1210 Oakman Blvd., Detroit, Mich.
National Broach & Machine Co., Detroit, Mich.

BROACHING MACHINES
Bullard Co., The, Bridgeport, Conn.
Cincinnati (Ohio) Milling Mch. Co., The.
Colonial Broach Co., Detroit.
Lucas Machine Tool Co., Cleveland
Oilgear Co., The, 1311 W. Bruce St., Milwaukee.

BRONZE FOR DIES
Ampco Metal, Inc., Milwaukee, Wis.

BRONZE—Phosphor
Bunting Brass & Bronze Co., Toledo, Ohio.
Phosphor Bronze Smelting Co., The, Philadelphia, Pa.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.

BRUSHES—Industrial
Pittsburgh Plate Glass Co., Brush Div., Baltimore, Md.

BRUSHES—Machine
Pittsburgh Plate Glass Co., Brush Div., Baltimore, Md.

BRUSHES—Paint
Pittsburgh Plate Glass Co., Brush Div., Baltimore, Md.

BRUSHES—Wire
Pittsburgh Plate Glass Co., Brush Div., Baltimore, Md.

BUCKETS—Clamshell
Blaw-Knox Div. of Blaw-Knox Co., Blawnox, Pa.
Cullen-Friestedt Co., 1303 S. Kilbourn Ave., Chicago.
Hayward Co., The, 50 Church St.,N. Y. C.
Heyl & Patterson, Inc., Pittsburgh.
Industrial Brownhoist Corp., Bay City, Mich.
Wellman Engineering Co., The, Cleveland

BUCKETS—Electric Motor
Hayward Co., The, 50 Church St.,N. Y. C.

BUCKETS—Orange Peel
Hayward Co., The, 50 Church St.,N. Y. C.

BUILDINGS—Steel
American Bridge Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
American Rolling Mill Co., The, Middletown, Ohio.
Belmont Iron Works, Philadelphia.
Blaw-Knox Div. of Blaw-Knox Co., Blawnox, Pa.
Iron & Steel Products, Inc., Chicago.

BULLDOZERS
Ajax Mfg. Co., The, Cleveland, Ohio.
Cleveland Crane & Engineering Co., The Steelweld Machinery Div., Wickliffe, Ohio.

BURNERS—Oil or Gas
American Gas Furnace Co., Elizabeth, N. J.
Babcock & Wilcox Co., The, 85 Liberty St., New York City.

BURNISHING MACHINES—Gear
Cimatool Co., The, Dayton, Ohio.

BURRING MACHINES
Cimatool Co., The, Dayton, Ohio.
National Broach & Machine Co., Detroit, Mich.

BUSHINGS—Bronze
Ampco Metal, Inc., Milwaukee, Wis.
Bunting Brass & Bronze Co., Toledo, O
Johnson Bronze Co., 505 So. Mill St., New Castle, Pa.
Phosphor Bronze Smelting Co., The, Philadelphia, Pa.
Shenango-Penn Mold Co., Dover, Ohio.

BUSHINGS—Drill Jig
Ex-Cell-O Corp., 1210 Oakman Blvd., Detroit, Mich.

BUSHINGS—Oilless
Rhoades, R. W., Metaline Co., Inc., Long Island City, N. Y.

BUSHINGS—Phosphor Bronze
Bunting Brass & Bronze Co., Toledo, Ohio.
Phosphor Bronze Smelting Co., The, Philadelphia, Pa.

BY-PRODUCTS COKE AND GAS PLANTS
Koppers Co., Engineering & Construction Div., Pittsburgh.

CABLE—Electric
General Electric Co., Schenectady, N. Y
Lincoln Electric Co., The, Cleveland.

CABLEWAYS AND TRAMWAYS—See Tramways

CALCIUM METAL & ALLOYS
Electro Metallurgical Sales Corp., 30 East 42nd St., N. Y. C.

CAMS
Hartford (Conn.) Special Machinery Co., The.

CARBIC
Linde Air Products Company, The, 30 East 42nd St., N. Y. C.

CARBIDE
Air Reduction, 60 East 42nd St., N. Y. C.
Linde Air Products Company, The, 30 East 42nd St., N. Y. C.

CARBIDE—Boron
Norton Co., Worcester, Mass.

CARBIDES—Cemented
Carboloy Co., Inc., 11153 East 8-Mile Road, Detroit, Michigan.

CARBURIZING BOXES
Electro Alloys Co., Elyria, Ohio.

CARBURIZING—See Heat Treating

CARS—Industrial and Mining
Heyl & Patterson, Inc., Pittsburgh.

CARS—Railway
Iron & Steel Products, Inc., Chicago.

CASE HARDENING—See Heat Treating

CASTERS
Darnell Corp., Ltd., Long Beach, Calif

CASTINGS—Acid or Heat Resisting
Ampco Metal, Inc., Milwaukee, Wis.
Cramp Brass & Iron Foundries Co., Philadelphia.
Duraloy Co., The, Scottdale, Pa.
Duriron Co., Inc., The, 438 N. Findlay St., Dayton, Ohio.
Electro Alloys Co., Elyria, Ohio.
Hoskins Mfg. Co., Detroit, Mich.
Lebanon (Pa.) Steel Foundry.
Meehanite Research Institute, Pittsburgh Pa.
Ohio Steel Foundry Co., Lima, Ohio.

CASTINGS—Alloy Iron
Cramp Brass & Iron Foundries Co., Philadelphia.

CASTINGS—Alloy Steel
Advance Foundry Co., The, Dayton, Ohio.
Electro Alloys Co., Elyria, Ohio.
Hartford (Conn.) Electric Steel Corp.
Lebanon (Pa.) Steel Foundry.
Mackintosh-Hemphill Co., Pittsburgh
National-Erie Corp., Erie, Pa.
Unitcast Corp., Toledo, Ohio.

CASTINGS—Aluminum
Aluminum Co. of America, Pittsburgh.

CASTINGS—Brass, Bronze, Copper or Aluminum
Bunting Brass & Bronze Co., The, Toledo, Ohio.
Cadman, A. W., Mfg. Co., Pittsburgh.
Cramp Brass & Iron Foundries Co., Philadelphia.
Koppers Co., Bartlett Hayward Div., Baltimore, Md.
National Bearing Metals Corp., Pittsburgh.
Phosphor Bronze Smelting Co., The, Philadelphia, Pa.
Shenango-Penn Mold Co., Dover, Ohio.
Spencer's, I. S., Sons, Inc., Guilford, Ct.
Wheeling (W. Va.) Bronze Casting Co.

CASTINGS—Corrosion Resisting
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
Cramp Brass & Iron Foundries Co., Philadelphia.
Electro Alloys Co., Elyria, Ohio.
Meehanite Research Institute, Pittsburgh, Pa.
Midvale Co., The, Nicetown, Phila., Pa.
Ohio Steel Foundry Co., Lima, Ohio.
Wall-Colmonoy Corp., Detroit, Mich.
Wheeling (W. Va.) Bronze Casting Co.

CASTINGS—Die
Titan Metal Mfg. Co., Bellefonte, Pa.

CASTINGS—Die, Aluminum
Aluminum Co. of America, Pittsburgh.

CASTINGS—Electric Steel
Continental Roll & Steel Foundry Co., East Chicago, Ind.
Crucible Steel Castings Co., Lansdowne, Pa.
Lebanon (Pa.) Steel Foundry.
National-Erie Corp., Erie, Pa.
Ohio Steel Foundry Co., Lima, Ohio.
Unitcast Corp., Toledo, Ohio.

CASTINGS—Gray Iron
Advance Foundry Co., The, Dayton, Ohio.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Engineering Co., Philadelphia
Cramp Brass & Iron Foundries Co., Philadelphia.
Diamond Iron Works, Inc., Minneapolis, Minn.
Etna Machine Co., The, Toledo, Ohio.
Gillette-Vibber Co., The, New London, Conn.
Koppers Co., Bartlett Hayward Div., Baltimore, Md.
Lobdell Car Wheel Co., Wilmington, Del.
National Roll & Fdry. Co., Avonmore, Pa.
North Wales (Pa.) Mach. Co., Inc.
Ramsey Chain Co., Inc., Albany, N. Y.
Spencer's, I. S., Sons, Inc., Guilford, Ct.
Sprout, Waldron & Co., 1400 Sherman St., Muncy, Pa.

CASTINGS—High Test & Alloy Iron
Cramp Brass & Iron Foundries Co., Philadelphia.
Meehanite Research Institute, Pittsburgh, Pa.

CASTINGS—Magnesium Alloys
American Magnesium Corp., 1701 Gulf Bldg., Pittsburgh.
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

CASTINGS—Malleable
Lake City Malleable Co., The, 5100 Lakeside Ave., Cleveland.
Peoria (Ill.) Malleable Castings Co.

CASTINGS—Manganese Steel
Taylor-Wharton Iron & Steel Co., High Bridge, New Jersey.

CASTINGS—Meehanite Metal
Meehanite Research Institute, Pittsburgh, Pa.

CASTINGS—Monel & Nickel
Cramp Brass & Iron Foundries Co., Philadelphia.

CASTINGS—Semi-Steel
Cramp Brass & Iron Foundries Co., Philadelphia.

CASTINGS—Steel
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
American Rolling Mill Co., The, Middletown, Ohio.
Bethlehem (Pa.) Steel Company.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Columbia Steel Co. (U. S. Steel Corp Subsidiary), San Francisco, Calif.
Continental Roll & Steel Foundry Co., East Chicago, Ind.
Crucible Steel Castings Co., Lansdowne, Pa
Hartford (Conn.) Electric Steel Corp.
Lebanon (Pa.) Steel Foundry.
Mackintosh-Hemphill Co., Pittsburgh
Mesta Mch. Co., Pittsburgh.
National-Erie Corp., Erie, Pa.
Ohio Steel Foundry Co., Lima, Ohio.
Standard Steel Wks. Div. The Baldwin Locomotive Works, Phila., Pa.
Strong Steel Foundry Co., Buffalo, N. Y.
Unitcast Corp., Toledo, Ohio.

CASTINGS—Wear Resisting
Meehanite Research Institute, Pittsburgh, Pa.
Wall-Colmonoy Corp., Detroit, Mich.

CEMENT—Acid-Proof
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.